ble by syllable, however, Vai script literates had no advantage over the other literates. This is consistent with the hypothesis that literacies have effects on cognitive tests that are specific to skills involved in their use.

Scribner and Cole demonstrated specific consequences of Arabic literacy with a memory task resembling learning of the Qur'an (learning a string of words in order, adding one word to the list on each trial). On this task, schooled English literates again ranked first, but here the Arabic literates performed better than either the Vai-script literates or the nonliterates. On other memory tests, however, Arabic literates showed no superiority in performance, suggesting a very specific literacy-related effect rather than a general improvement of memory.

Results of these and other tests indicate that components of reading and writing skills may promote very specific language-processing and cognitive skills, but that literacy does not inevitably lead to widespread skills in memory, classification, and logical inference. Scribner and Cole explain these results in terms of a "practice account of literacy," which though incompletely developed appears to be the beginning of a promising theoretical approach to cognitive processes. By practice, they mean "a recurrent, goal-directed sequence of activities using a particular technology and particular systems of knowledge" (p. 236). Their concept of practice involves socially constructed ways of using technology and knowledge to accomplish tasks. With any particular literacy, the skills developed will be determined by the way literacy is used, in reading and writing that script for specific purposes under specific circumstances.

For social scientists interested in the relation of culture and cognition, this book provides a landmark research program and a model for future efforts. The studies are carefully executed, involving an appropriate variety of methods (experiments, ethnographic observations, interviews, and surveys). The research program considers other background variables that often covary with literacy and schooling, such as modernity and age, to control for their possible effects. The authors have done an admirable job of explaining the rationale and results of the research in nontechnical terms. Nevertheless, the number of regression equations and the complexity of the series of studies may render the book slow reading for those unfamiliar with such methods. The results are methodically presented and cautiously interpreted in building the theoretical framework. *The Psychology of Literacy* provides us with the message that it is important to consider the function of a skill and the conditions in which it is practiced, rather than to assume that a skill observed in one situation represents a general ability.

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Seismology

Seismic Waves and Sources. ARI BEN-MENAHEM and SARVA JIT SINGH. Springer-Verlag, New York, 1981. xxii, 1108 pp., illus. $90.

The great successes of seismology as a quantitative science since 1950 are often, and with justification, attributed to the introduction of modern instrumentation and digital techniques. Workers in the field are equally dependent, however, on the articulation of the major body of theory by which elastic wave excitation and propagation in the earth may be described. To appreciate the developments in this field that have occurred in the past 25 years, one need only compare the massive new compendium by Ben-Menahem and Singh with *Elastic Waves in Layered Media*, the pioneering work by Ewing, Jardetsky, and Press (1958). The new book offers over 3400 numbered equations of no small length in 944 pages of text, along with another 150 pages with 12 mathematical appendixes.

The authors have produced a comprehensive, consistent account of every aspect of the subject. Beginning with the customary invocation of classical continuum mechanics, subjects are unfolded in a branching tree whose heavily laden boughs contain every fruit known to the profession. A great encyclopedia of completed, worked-out derivations and problems lies in the hand of anyone who wants to know "how to solve it." The material on vector and dyadic fields, reminiscent of the approach of Morse and Feshbach, provides a series of consistent, complete, and cumbersome representations that are subsequently used in formulating solutions to the specific problems. The following chapters on plane waves in layered media are probably the least inspired in the book, being a relatively conventional account of the best-known aspects of seismic wave propagation. The full working out of seismic source representations that follows, however, brings into one equation-filled chapter the full machinery that has developed over the past 20 years for the mathematical representation of the various point sources in the separable coordinate systems. The subsequent chapters on normal modes, generalized rays, and the asymptotic theory that relates the two form the heart of the book—over 450 pages devoted to the detailed working out of the different representations and approximations for the elastic wavefield in a layered spherical earth. Many important developments based on the Watson transformation and rainbow expansion appear here. A chapter on seismic wave attenuation offers a full advanced-level discussion that, though somewhat disjoint from the rest of the book, is a welcome part of it. The chapter on atmospheric and water waves seems to be of less importance in the scheme of things.

The mathematical appendixes alone would justify the acquisition of the book by a research worker. Concise accounts are given, inter alia, of dyadic calculus, generalized spherical harmonics, causality, and Airy functions.

The book is a valuable companion for the research seismologist or advanced student who wishes to solidify an acquaintance with some aspect of theoretical seismology. The logical organization of the book and the consistent use of notation make it possible to trace a result back to its fundamentals. The book would lie on the shelf next to Morse and Feshbach's *Methods of Theoretical Physics* and Abramowitz and Stegun's *Handbook of Mathematical Functions*; it forms, in effect, a seismological extension of the former.

The format is well designed and pleasing, and I have never seen a book of this nature in which it was so difficult to find minor errors.

In a book of this size, one wonders whether every page is equally worthy of inclusion. Frequent "extra cases" are tacked on that contribute nothing new, numerical tables giving data such as surface wave perturbation parameters are of little interest, and some of the discussions contain too many intermediate steps and explanatory words.

The completeness of the book, in its classical treatment of elastic waves, by no means eliminates the need for a monographic treatment that would emphasize simplicity and transparency of approach. Indeed, the completeness of the machinery in the book is a deterrent to the student seeking a clear delineation of the subject.

The bibliographic lists at the ends of each chapter are useful though not particularly complete—a shortcoming with respect to several excellent treatments

that are drawn from the 1970-to-1975 literature and still deserve citation. The dates in the bibliographies confirm my impression that most of the book was drafted before 1975. Recent developments have tended to restructure the known results into a more concise, theoretically simple framework than is evident here. In particular, linear inverse theory, which has become a key tool in modern seismology, is not covered.

In short, Ben-Menahem and Singh have produced a formidable work that succeeds beyond normal expectation in covering most aspects of the subject consistently and well.

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Proopiomelanocortin Peptides

ACTH and LPH in Health and Disease. TJ. B. VAN WIMERSMA GREIDANUS and L. H. REES, Eds. Karger, Basel, 1981. x, 210 pp., illus. $79.25. Frontiers of Hormone Research, vol. 8.

This monograph provides a timely and comprehensive review of the proopiomelanocortin (POMC) peptide system and its involvement in normal and diseased states. POMC is the precursor protein to ACTH and LPH. The system is interesting in that it involves several different hormones: adrenocorticotropin, β-endorphin, and α, β, and γ melanocyte-stimulating hormone. In addition, the protein is expressed in a large variety of tissues, such as the intermediate and anterior pituitary, hypothalamus, gut, and placenta, and factors regulating the synthesis and secretion of POMC-related peptides vary depending upon the expressing tissue.

The comprehensive nature of this book makes it useful in understanding the involvement of these peptides in both normal and diseased states. Because of the complexity of the system, no subject is treated in depth; however, the major subjects are discussed, and the basic literature is cited in all cases.

The contributors succeed in identifying the complexities of regulation in this system, which stem from its being polyhormonal. There is also discussion of the synergistic activities of many of the hormones. Often the biological activity of one of the POMC peptides is modified by one of the other hormones derived from the common precursor. This is a newly recognized fact, which will become increasingly important as more polyhormonal systems are described.

The book also deals with quantitating the hormones in plasma. In the POMC system, where there is substantial immunological cross-reactivity between the various hormones owing to the various melanotropin sequences, it is important to understand the exact regions of the hormone that are recognized by the antibody in the radioimmunoassay. Several papers deal with the idea that plasma POMC-related peptides can be derived from tissues other than pituitary, particularly in the case of ectopic tumors.

There is an extensive review of the involvement of the POMC-related peptides in the central nervous system. Although the hypothalamus appears to be the primary site of synthesis of brain POMC peptides, they have been localized in a variety of different regions, having most likely been brought there by axonal transport. The effects of POMC peptides in the central nervous system on pain and behavior are discussed.

Of particular interest is the extensive treatment of the anatomical connections between the brain and the pituitary. There is an enlightening section on blood flow in the pituitary-hypothalamic system. The possibility of pituitary-stalk retrograde blood flow is discussed critically, as are other mechanisms for the delivery of pituitary hormones to the brain. The description of the blood flow in this region leaves one with the idea that the POMC peptides from the intermediate lobe may be involved in regulating the anterior lobe in a manner analogous to that by which the anterior lobe is regulated by the hypothalamus.

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Antibiosis

The Future of Antibiotherapy and Antibiotic Research. Papers from a conference, Paris, Feb. 1980. L. NINET, P. E. BOST, D. H. BOUANCHAUD, and J. FLORENT, Eds. Academic Press, New York, 1981. xx, 508 pp., illus. $60.

This book is a compilation of 31 papers by 44 participants in the Second Rhône-Poulenc Round Table, which had as its stated objectives an evaluation of current knowledge of antibiotic activity, resistance, and mechanisms of action and an analysis of future requirements in antimicrobial therapy. The conference brought together a large group of experts on antibiosis whose collected presentations and discussions provide important and valuable information to anyone interested in the field.

The book is in four parts. In the first part a series of papers devoted to current patterns of susceptibility and the emerging resistance of aerobic, facultatively anaerobic, and anaerobic bacteria, though it does not provide particularly novel information, sets the stage for papers on the ecology of transferable resistance by Richmond and Petrocheilou and the surveillance and audit of antibiotic usage by Kunin (the latter providing a rather detailed description of an approach to this newest requirement by the Joint Commission on Accreditation of Hospitals). Of special interest in this part is a series of papers on the uses of antibiotics in veterinary medicine and in animal feeds, including a reasonably dispassionate and nonpolitical assessment of the benefits for food production, which are significant, and the risk to humans of the latter practice, which has not been documented.

The second part of the proceedings addresses various approaches to the evaluation of new antibiotics in vitro and in vivo. Included in this part are papers on the selection of strains for susceptibility testing (Chabbert), the assessment of inhibitors of cell wall (Tomasz) and protein (Vazquez) biosynthesis, and the potential importance of the effects of antibiotics on bacterial adhesion (Chabanon). The novel aspect of this part of the proceedings is that it takes a molecular approach to determining the action and effects of antibiotics. The effort to develop new antibiotics now can focus on those agents that are able to suppress or overcome the mechanisms of microbial resistance that have been identified to date (Davies).

The third part of the book deals with various approaches to the development of new antibiotics, including screening of organisms for antibiotic production, genetic recombination, and directed biosynthesis. The final part contains general discussions by Richmond, Davies, and Demain.

At the conclusion of the book, one is left with a contingent of participants who strongly support continuing efforts to develop new antibiotics with activity against an ever-mounting tide of resistant bacteria and another contingent who argue that the existing armamentarium of antibiotics is sufficient but requires more rational and better utilization. Although