of the questions that inevitably will loom larger as the pace of the federal effort quickens and new programs evolve to meet new national needs.

What is required above all else in facing these problems is for the colleges and universities to understand that, like it or not, they are deeply and irrevocably engaged in the business of politics. In the politics of higher education, there is no place for the amateur and the incompetent. As Homer Babbidge and his colleague note, "Those who believe that the business of making things happen in politics is beneath their dignity or not worth their time are likely to be hurt." Free universities can help shape the public policy in the national interest, but only if they know what they believe and are willing to do battle in the public forum.

Animal Cells and Tissues

Electron Microscopy. A textbook for students of medicine and biology. Gilbert Causey. Williams and Wilkins, Baltimore, Md., 1962. vii + 239 pp. Illus. $9.50.

Gilbert Causey has undertaken the commendable task of preparing a comprehensive, though not complete, description of mammalian animal cells and tissues as they are revealed by electron microscopy. The chapter headings include: "The electron microscope," "Specimen preparation," "The cell," "Bone, muscle, and fascia," "The cardiovascular system and blood," "Skin," "The digestive system," "The respiratory system," "The urogenital system," "The ductless glands," "The nervous system," and "Special senses."

Such a brief textbook with numerous illustrations would fill a void that currently exists in this area, if it were a scholarly effort, carefully produced. In my opinion that goal, unfortunately, has not been achieved. This book, which is intended as a textbook for students of medicine and biology, both undergraduate and postgraduate, is plagued with an insufficient bibliography (a total of 78 references). Approximately 200 author citations appear within the text. Although Causey states in the preface that he has reluctantly left out specific references to each original investigation, he has not cited in the bibliography most of the authors referred to within the text. This is most troublesome, since several author citations are erroneous. The uninitiated undergraduate and postgraduate will really have to scratch if their interest is aroused by particular points raised in the text. In addition, the alternate usage of Palade granule, ribonucleoprotein granule, and ribonucleic acid is bound to be troublesome.

The book has an adequate number of electron micrographs. But in addition to unnecessary duplication (one appears three times), some of the figures are not informative, and many are inadequate. Once again, if the author citations were given in the bibliography, the student would have ready access to numerous electron micrographs, many infinitely more useful than those in the book.

It is only natural that the interpretation of experimental material will encourage controversy and stimulate discussion and research. The student, however inexperienced, should be encouraged (by easy access) to examine the original work, which forms the basis of the textbook writer's interpretation. This is of special importance in the rapidly developing research technique of electron microscopy as applied to cells and tissues.

It is to be hoped that a subsequent edition will be more satisfying than this first effort.

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Advanced Textbook

Atomic Spectra. H. G. Kuhn. Academic Press, New York, 1962. xvi + 436 pp. Illus. Plates. $13.

Kuhn's very good *Atomic Spectra* is the first new English-language book on the subject, suitable for advanced undergraduate or beginning graduate study, to appear in a quarter century, except for the recent, less descriptive but theoretically much more ambitious *Quantum Theory of Atomic Structure* by Slater.

In the earlier books special theoretical background material has usually been developed as needed, but Kuhn has gathered into the second chapter an appropriate brief outline of theoretical methods, upon which he later draws freely, as needed, without breaking continuity. The compilation of quantum mechanical methods is a competent review outline but not an adequate substitute for a more thorough introductory study of quantum mechanics. The remainder of the body of the volume consists of five chapters on simple spectra (136 pages), periodic table and x-ray spectra (27 pages), complex spectra (75 pages), hyperfine structure and isotope shift (59 pages), and width and shape of spectral lines (23 pages). Experimental methods are not considered. Unfortunately the manuscript was finished too soon to derive any material from Edlén's great monograph in the *Handbuch der Physik* series.

Instead of discussing alkali metal atoms immediately after treating hydrogen (the usual sequence), Kuhn considers the light atoms in order, according to atomic number, and succeeds in giving the reader a feeling for the electron core before he describes lithium. The chapter on complex spectra contains an introduction to the Slater integrals and mention of Racah's methods. The omission of more than a brief reference to *f*-electrons can be considered pedagogically as an element of strength, but the lack of a comprehensive table of ground configurations of the elements is a weakness.

In my opinion the best chapter is the one on hyperfine structure and isotope shift, one of the fields in which the author has made significant contributions. An unexcelled compact exposition covers the general features of nuclear magnetic dipole and electric quadrupole interactions in one- and several-electron atoms and the isotopic mass effect and field (called "volume) effect.

The exposition is generally clear, but there is throughout an informality in the introduction of terms that, while it need not disturb the advanced reader, may sometimes confuse the beginning student. Items in point are *core* (pages 11 and 150), *vector model* (page 27), *state* (page 33), *statistical weight* (pages 66 and 118), *resonance line* (page 156), and *center of gravity* (page 170). The subject index is rather sparse.

The volume is well illustrated, with 114 figures as well as four glossy sheets of plates that include fine reproductions of classic spectograms produced by such old masters as Back, Foster, Siegbahn, and Jackson and Kuhn. In comparison, White's text has 263 fig-

ures, Herzberg's 80, and Slater's 68.

I am confident that there will be an early demand for a second edition, if it is not stifled by reaction to the unconscionable price of 3 cents per octavo page. In a second edition several improvements should be made in the format: Cross reference can be made easier by printing chapter and section numbers (and perhaps even figure, table, and equation numbers) at the top of each double page; the plates, usually many pages removed from their context, should be collected in one place or always referred to by the number of the facing page; the cumbersome and undoubtedly expensive foldouts should be replaced by two-page spreads; and almost all the lazy tables should be righted so that they can be read without rotation of book or student.

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Man's Family Tree

Ideas on Human Evolution. Selected essays, 1949–1961. William Howells, Ed. Harvard University Press, Cambridge, Mass., 1962. xiii + 555 pp. Illus. $10.

This volume, as its editor—himself a distinguished anthropologist and authority on man—points out in his preface, is intended to survey the views developed on the subject of human evolution during the decade immediately past. It is a range of ideas by leading authorities in this field that the editor aims to present, not primarily data or facts well-known to the profession. Again, as Howells indicates, these "facts" are subject to varying interpretations. In this, save for the range of time represented, they are no different than the facts of written history which have a way of altering their shapes and meaning with the passage of time and human generations that look upon them differently.

The papers making up the volume represent the contributions of renowned foreign and American scholars such as Dobzhansky, Weidenreich, Straus, Schultz, Simpson, Mayr, Gregory, Le Gros Clark, Oakley, Washburn, Vallois, and others equally well known. Their individual subjects range from the Italian Neanderthals to the earliest subhuman phases of man's family tree. Each paper has been skillfully chosen, not alone for content but also for its ability to reveal the provocative and exciting nature of new developments in a field always marked by controversy even after the full acceptance of the evolutionary point of view. The more the number of primate fossils has increased, the more devious and elusive appear the paths by which we may have reached our present status.

There has, furthermore, been an almost unconscious shift in our approach to the human phylogeny. The 19th- and early 20th-century workers were confronted with a paucity of human remains. Scientists were faced, therefore, whether consciously or unconsciously, with the problem of convincing the general public that human evolution was a reality. Until the Pleistocene phase of man's history was explored, it was scarcely possible to grapple satisfactorily with his more remote relationships.

As one studies the papers in this volume, it becomes apparent that the precise point of divergence of the brachiating anthropoids from the less specialized primates, who also gave rise to bipedal man, is still a debatable question, confused by the dangers of mistaking parallelisms for more intimate relationship. In addition, these earlier phases of human history have had to wait upon the examination and analysis of remains closer to us in time. Now at last the hunt goes deeper, but there are still million-year gaps in human history and much room for honest, anatomical difference of opinion.

Howells has done a great service to science by collecting into one volume some of the most important evolutionary papers of our generation. To indicate a few untreated facets of the subject would be only to say that each worker has his own preferences, that any book can contain only so much material, and that vast areas of the world and man's history within it still remain to be explored.

Human ideological differences today obstruct the examination of regions now known to contain great evolutionary secrets. It is a pity that ferocious and irrational nationalisms threaten to stifle one of the most dispassionate of scientific pursuits. No contemporary animus can shift the cusp on a single fossil tooth or change the road by which we have reached our present dubious status. It can serve only to underline the fact that we are still divided, half-world creatures glancing alternately backward into an obscure past and forward into a future that we increasingly tremble to enter. *Ideas on Evolution*, if read with perception, should aid in giving us, if not confidence, at least that long, wide range of philosophical detachment which characterizes the species *sapiens* in some of its nobler moments.

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Economic Statistics

Trends in Natural Resource Commodities. Statistics of prices, output, consumption, foreign trade, and employment in the United States, 1870–1957. Neal Potter and Francis T. Christy, Jr. Johns Hopkins Press, Baltimore, Md., 1962. ix + 568 pp. Illus. $17.50.

Potter and Christy tabulate the production, trade, consumption, prices (at the "wellhead"), and labor required for production of 90 percent (by their estimate) of what we casually call "raw materials." These results are for the United States over essentially the century since the Civil War; no regional distribution is given. The great bulk of the book is concerned with individual commodities. Procedure in resolving conflicts among different sources are, in general, clearly shown; notes keep the reader straight on what is being done; and references provide a wealth of signposts to the background.

The authors are concerned with the economy, with constant-value dollars, gross national product (GNP), and commodities in the market rather than with the resources from which they came. Accordingly, one expects no mention of the acres of open land, of the quality of wilderness, of the frequency of wood thrush songs, or even of how much air remains unused for smog and how much water is still available for contamination. The reader who wants per capita caloric intake will have a struggle, but if he stays with the single commodity tables he can make it.

Only occasionally do difficulties arise—for example, in determining that the statistics given are for rough rice, not for brown rice. Again, hydropower is not mentioned.