ground, providing us with the first reliable comparative studies of these important aspects of business history. We are much in debt to them, whether we agree with their "tentative hypotheses" or not. Without their essays we would still lack the essential comparative perspective this volume provides. The book and the project that gave rise to it are boldly conceived and well executed. One can safely predict that the book will evoke in Europe and elsewhere the same sort of enthusiastic scholarly interest that Chandler's work has already stirred up in the United States. The result will be a far better understanding on the part of historians and economists of those giant corporations that dominate the Western economies today.

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Evolutionism in America

The Triumph of Evolution. American Scientists and the Heredity-Environment Controversy, 1900–1941. HAMILTON CRAVENS. University of Pennsylvania Press, Philadelphia, 1978. xxiv, 352 pp., illus. $17.50.

The debate among scientists about the relative importance of heredity and environment in human evolution and about the respective roles of cultural and genetic factors in explaining apparent differences among ethnic, national, or racial groups has continued from Darwin's day to the present. Hamilton Cravens believes that the period between the 1890's and the 1940's constituted a distinct and particularly important epoch in these transatlantic disputes.

Cravens describes the widespread claims made during the 1890's by a new generation of largely American biologists and psychologists that their experimental evidence finally made it possible to disentangle genetic from environmental phenomena and thus to produce clearer explanations of evolutionary questions. On the basis of their reading of that evidence, this generation of American scientists imposed radically hereditarian interpretations upon virtually every problem connected with evolution. Cravens attributes that hereditarian bias largely to the ethnic makeup of the American scientific community—almost completely WASP—at a time when their ethnic group felt itself challenged by others, such as blacks, eastern and southern European immigrants and their children, and individuals of Irish Catholic descent. These "others" were occupying American cities and seizing positions of political and economic power. The same WASP scientists led the way in encouraging the belief that a science of human behavior, the outlines of which they claimed to know, could predict and perhaps control human behavior. Their claims for their "science" justified laws, customs, and beliefs that did indeed control to a significant degree the challenging "other" ethnic groups.

Cravens devotes the second half of his book to the successful attacks on hereditarian theories launched between 1915 and 1930 by another generation of again largely American scientists. By 1930 cultural evolution held the primary place and biological evolution a secondary one in explanations of human social behavior. This time American anthropologists and sociologists, rather than the biologists and psychologists who had done so earlier, took the leading roles in the controversy, though virtually every type of natural and social scientist and many popularizers of scientists' data and ideas both in the United States and Europe participated. Once more changes in American society determined the course of the scientific debate. The rise to positions within the American scientific community of members of the formerly "inferior" groups and the development of an American intelligentsia with its own value system were the most critical social shifts connected to this new dominant scientific perspective. In an interesting but not fully developed section of this part of the book, Cravens describes continued interest in a science of man, and he implies that progress was made toward creation of such a science.

Most of the ideas in *The Triumph of Evolution* will be familiar to scholars acquainted with the literature concerning evolutionary concepts. They dominate recent writing about the topic. Cravens's most significant contribution lies in the extraordinary comprehensiveness of his treatment. He has brought together most of the recent scholarship with a formidable amount of his own and thus covers most of the important sectors of the natural and social sciences. He tends to move systematically from one scientific field to another, providing careful and reasonably thorough descriptions of the most important developments connected with his topic in each. Although he concentrates on events in the United States, Cravens occasionally pauses to present informative and sometimes quite original analyses of analogous work connected with the controversy in Europe. His analysis of the theories of the Dutch botanist Hugo de Vries places de Vries more precisely within these disputes than does any work that I have seen, except perhaps for a single article by Garland Allen. However, his treatment of Franz Boas and his students is derivative and at important points superficial. For example, he seems unaware that scholars such as Margaret Mead, Edward Sapir, Ruth Benedict, Ruth Bunzel, Alfred Kroeber, and Alexander Goldenweiser rejected not only the hereditarian thesis of racial hierarchy but important aspects of the whole idea of Western cultural evolution in the Darwinian sense as well. In their view, and to a lesser extent even in Boas's, technologically primitive cultures provided more satisfactory lives for their members than did Western middle-class culture, despite the latter's allegedly higher rank on the evolutionary scale.

Cravens's scholarly caution and use of qualification usually seems an asset to his book. The "triumph of evolution," Cravens declares, was far from a clear-cut victory. "What had really happened," he suggests (p. 265), "was that, at least for a generation or so, American scientists had discovered that an either/or question . . . was too difficult and perhaps profitless to discuss further." Therefore the decision during the 1930's by most scientists to allow biological evolution to retain its primary place in the study of human beings as a species but to grant cultural evolution the major role in explanations of human behavior within society, with statements about both types of phenomena placed in the context of quantitative discussions about the relative weight to be given the biological and cultural variables, amounted to an armed truce.

Cravens believes that the nature-nurture controversy will continue, and probably not in the old terms, such as those used by reactionaries still trying to prove racial and ethnic inferiorities. He discerns an acceptance within business and government bureaucracies of assumptions borrowed from evolutionary science, which taken together "provide the possibilities for social order and control in an entirely new kind of society." Industrial psychology, achievement and aptitude tests, and techniques used by the mass media, the advertising industry, and political parties all supply evidence for this hypothesis. Cravens seems quite optimistic about this "new kind of society," an attitude that would not have been shared by Boas's foremost students or by all of those who agree with Cravens's hypothesis about the new possi-

bilities for "social order and control."

Cravens clearly is a reasonable person who possesses an unusually large store of goodwill toward his fellow human beings, including scientists who held or hold ideas with which he disagrees. He has written a clear and reasonable synthesis in line with recent scholarship dealing with the course of evolutionary ideas in the natural and social sciences. His optimistic assumptions about the future course of these ideas, however, have led him to what some readers will consider naïve conclusions about their present state. Nevertheless, *The Triumph of Evolution* now stands as the most thorough exploration of evolutionary thought in the United States during the period it covers, and it makes a persuasive case for the conclusion that, contrary to those who have stressed German, British, and French developments, the major and broadest scientific dispute about evolution in this era occurred in the United States. Cravens has explored and evaluated these arguments, including disputes that originated in Europe, so carefully that his book deserves a wide reading and his conclusions a decent amount of respect. Both his interpretations of facts and his broad ideas, however, will find challengers among other specialists in this field.

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Disordered Systems

La Matière Mal Condensée. Ill-Condensed Matter. Papers of a summer school, Les Houches, France, July 1978. ROGER BALIAN, ROGER MAYNARD, and GERARD TOULOUSE, Eds. North-Holland, Amsterdam, 1979 (U.S. distributor, Elsevier, New York). xxvi, 610 pp., illus. $97.50.

Solid state physicists have been gradually disappearing through metamorphosis into condensed matter physicists. The new term not only suggests a new image and a divorce from semiconductor devices, it is also more accurate in that it indicates the inclusion of fluids and glasses. Moreover, "solid state physics" has come to suggest the physics of ordered crystals, whereas there is now a rapid growth of interest in disordered materials. The title of this volume of lecture notes from a Les Houches summer school uses "ill" to restrict its referent to just these disordered materials, the perfect crystalline state presumably being regarded as well condensed. The pejorative flavor of "ill" is not entirely inappropriate; disorder has long been viewed as slightly unclean and certainly has been a source of great difficulty in both experimental characterization and theoretical understanding.

However, in the introduction to his own lectures, P. W. Anderson expresses the belief that a quiet revolution has taken place. He points out that we have largely abandoned trying to treat disordered materials as modified crystals and are now looking for the characteristic properties of disorder in its own right. Although we have as yet few answers, Anderson thinks that we are now asking much better questions, as is shown by the emergence of new concepts specific to disorder, such as localization, percolation, and frustration. Throughout the volume—especially in Anderson's lectures—there is a feeling of confidence and excitement in the blossoming of disordered system physics.

Anderson's introduction is the only general overview in the book, and one wishes it were longer. The bulk of the book is concerned with a detailed account of the current state of the art, mainly from a theoretical viewpoint. There is one experimental review, by J. Joffrin, summarizing the properties of glasses and spin glasses. These are the only major lectures in French. The remaining lectures (the book also contains some shorter seminars) cover most of the field theoretically and successfully avoid excessive overlap. The level of the lectures is such that any student reasonable versed in conventional well-condensed matter theory should be able to follow most without difficulty. The most notable exception must be the lectures by V. Poénaru on algebraic topology and its applications to defects in ordered systems. These provide a beautiful exposition of the subject from a mathematician's viewpoint but assume a background in algebra and topology uncommon among condensed matter physicists.

There is plenty more for the expert. Anderson in particular has the disarming habit of throwing out highly original ideas in the midst of a lecture. Indeed, many of the subjects and concepts discussed in the volume have their origins in his earlier comments. In his lectures he discusses glasses, random electronic systems, and especially spin glasses, which he dubs the "easy" case. He brings fresh insight to all these areas.

The remaining lectures are by D. J. Thouless, on percolation and localization, by S. Kirkpatrick, on real space renormalization group and computer simulation methods, and by T. C. Lubensky, on critical phenomena in random systems.

Disordered system physics is, of course, advancing so rapidly that the book is already out of date in some areas; the most obvious example is the recent progress in understanding one-dimensional localization and conductivity. But overall, these lectures are an excellent summary of our present understanding of disorder and provide much provocative speculation. All the lectures are by the leaders in the field. As the first review volume by such experts, the book will undoubtedly become a standard reference work. And so it should.

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High Energy Physics

Relativistic Particle Physics. HARTMUT M. PILKUHN. Springer-Verlag, New York, 1979. xii, 428 pp., illus. $42. Texts and Monographs in Physics.

During the past dozen years, a revolution has occurred in the prevailing view of particle physics. It is now generally believed that a fundamental description of subnuclear physics must be based upon the idea that strongly interacting particles (hadrons) are composed of quarks. Together with leptons, such as the electron and neutrino, and a variety of force particles, including the mediator of electromagnetism called the photon, quarks seem to be the elementary particles—at least at the present limits of resolution.

The support for this new point of view is multifarious and impressive. It derives from the familial patterns of hadrons, the experimental evidence for pointlike constituents within hadrons, the discovery of the atomic-like spectra of the heavy mesons J/ψ and Υ, the successful prediction of charm, and the triumph of the Weinberg-Salam model, with its implication of weak neutral currents. According to optimists, a grand synthesis of the strong, weak, and electromagnetic interactions is already at hand. A number of experiments are being mounted to search for the proton instability implied by specific grand unified theories. Some physicists with an appreciation for history, troubled by the proliferation of "fundamental" constituents, now are investigating the possibility that quarks and leptons may themselves be composite.

In view of this paradigm, the appear-