Book Reviews

Predestined Educational Inequalities Today

Slums and Suburbs. A commentary on schools in metropolitan areas. James Bryant Conant. McGraw-Hill, New York, 1961. viii + 147 pp. Cloth, $3.95; paper, $1.95.

James Conant writes about the complex way in which ecological and social class factors interact and mutually reinforce each other to produce gross inequalities of educational opportunity in the United States. This, of course, is a phenomenon common to all the industrial countries of the world, in which local communities vary widely in social composition. Everywhere it is the case that the larger the proportion of manual or agricultural laborers in the local population is, the poorer is the local cultural and educational endowment and the lower is the modal level of social and educational aspiration. Everywhere these differences result in disparities, according to locality, in educational achievement between children of similar measured intelligence or aptitude, within as well as between the social classes. From top to bottom in the social and intellectual hierarchy, the children attending schools in the prosperous suburbs emerge relatively better equipped academically than the children from schools in small villages or large industrial cities.

Conant, however, is concerned with demonstrating the exacerbating influence, in the case of the United States, of two particular factors: the system of financing public education and the ecological segregation (*de facto*, not *de jure*) of ethnic minorities—in particular, the concentration of migrant Negroes in the slums of the big northern cities. He bitterly regrets the historic failure of Congress to establish a federal policy for education. He paints a deeply disturbing picture of a frustrated and delinquent generation of largely unemployed Negro adolescents, a picture of financial handicap, impoverished material equipment, high pupil-teacher ratios, and high teacher turnover in precisely the areas of greatest educational need—namely, the slums in which congregate the large transient families of unemployed, unskilled, unschooled, and often criminal or mentally sick breadwinners on the move from the South.

From his depressing catalog of social and individual miseries in these areas, Conant derives a number of interesting and controversial propositions. The problems of Negro education are no different from those of all underprivileged social groups; thus, we should not allow racial considerations to cloud the formulation of policy. Enforced mixing of *de facto* segregated school populations is less important than adult education among parents and literacy drives among slow learners in the schools. The problems of Negro unemployment, however, are characteristic and justify special measures: the prohibition of discrimination by employers and labor unions; the financing of public works to provide employment, especially for young people aged 16 to 23, of whom more than 50 percent are unemployed; and the vocationalizing of the high school after the 10th grade.

The purely pedagogical problems of slum schools that deal with large bodies of culturally deprived slow learners during 12 years of compulsory education lead Conant to formulate an educational heresy: that the curriculum and organization of schools should reflect the socioeconomic status and needs of the communities they serve and, in particular, that they should prepare pupils directly and explicitly for the local labor market.

When Conant derives the same proposition from his study of the wealthy college-oriented suburbs at the other end of the spectrum of inequality, its heretical character will no doubt strike his predominantly middle-class readers with more force. Here in the suburbs is a dual problem: on the one hand, how to raise standards of preparation for entry to higher education and, in particular, how to broaden the range and stiffen the content of advanced courses in the high school; on the other hand, how to diminish the indiscriminate emphasis on college-going among suburban parents by arousing a sense of the value of vocational courses in the high school and thus lessening their frenzied desire for the longest possible education for their children regardless of its content and quality.

A substantial investigation related to the first problem yielded "academic inventories" for six large, selective, academically oriented high schools. These data are presented to substantiate Conant's contention that it is both desirable and possible for the American equivalents of European sixth-formers to have and to profit from a comparable academic load. The second problem is perhaps more intractable in a society in which upward social mobility through education is not the privilege of a selected and sponsored minority but is open to all who will make the attempt, regardless of whether they can succeed. Conant confines himself to the suggestion in this connection that counseling in suburban high schools should be "realistic" in relation to college-going and that the schools should look betimes to the possibility of vocationalizing the advanced courses undertaken by children of average and below-average ability. That is, he reiterates the educational heresy in a context in which it is likely to prove even less acceptable to liberal educators.

JEAN FLOUD
Institute of Education, University of London

Astronomy—Geophysics

The Rotation of the Earth. A geophysical discussion. W. H. Munk and G. J. F. MacDonald. Cambridge University Press, New York, 1960. xix + 323 pp. Illus. $13.50.

Study of the variations of the earth's speed of rotation proceeds along two lines: determining the variations from astronomical observation and attempting to provide geophysical explanations for them. As the subtitle indicates, this book is chiefly concerned with the second problem, a large one. "The diversity of

the subject is appalling. It touches on every branch of geophysics." Hence the authors discuss not only the astronomical data but also wind and air masses; atmospheric, oceanic, and bodily tides; sea level; rigidity of the earth's mantle; and motion in the Earth's fluid core. For good measure, one piece of Jules Verne's science fiction is discussed.

The dynamics of the variations in speed of rotation and the motions of the axis of rotation, such as the 14-month Chandlerian motion, are treated together. Observational data are analyzed in terms of the "power spectrum." Variations in speed—for example, monthly, annual, irregular, and secular variations — are considered as strong lines in the spectrum.

Secular retardation is given extensive treatment. The authors find that, as yet, there is no satisfactory explanation of how the energy lost by tidal friction is dissipated.

Polar wandering during vast ages of the past is treated in the chapter on geological variations. (Precise astronomical observation goes back only 60 years.) Paleomagnetic evidence, much of it speculative, is discussed, and the authors conclude, "The story of polar wandering is varied and complex. Our principal conclusion is that the problem is unsolved."

The book evidently stems from researches published since 1950 by M + V, where M denotes W. Munk and V is a variable author—G. Groves, E. M. Hassan, R. Haubrich, G. J. F. MacDonald, R. Miller, Y. Mintz, or R. Revelle. The subjects, however, are treated anew, critically and systematically, and the authors do not attempt to force theories to fit the facts.

The volume has been well prepared; it contains four pages of symbols, a reference bibliography, and an index. The faults are few. The photograph in the frontispiece is not described; the linear scale shown has no dimensions. (I have the same feeling toward unexplained photographs in a technical book as I have toward the absence of an index.) According to the authors, "The geophysical discussion is intended for a reader without special training in various branches of this science." Can they really mean this? The description of power spectra (in appendix 2) is far too condensed to be useful. Two methods for representing changes in speed of rotation are ascribed to D. Brouwer (1952), but Brouwer says he presented only one.

This book was awarded the Monograph prize of the American Academy of Arts and Sciences for the year 1959 in the field of physical and biological sciences. As far as I know, it is the only comprehensive treatment of the rotation of the earth, and I recommend it for use in any library concerned with astronomy, geodesy, and geophysics.

WM. MARKOWITZ
U.S. Naval Observatory, Washington, D.C.

"Mechanistic" Reinterpreted

The Mechanization of the World Picture. E. J. Dijksterhuis. Translated by C. Dikshoorn. Oxford University Press, New York, 1961 viii + 539 pp. Illus. $18.60.

All students of the history of science concerned with the so-called Scientific Revolution of the 17th century will welcome this English translation of Dijksterhuis' *De Mechanisering van het Wereldbeeld* (Amsterdam, 1950). This work, both in its original form and in the German translation (1955), has already become a classic, for its author is one of the most profound interpreters of the history of mathematics and mechanics. The author modestly claims that his interpretation of the mechanization of physical science is not "intended as a handbook for historians of science; [that] it has been written for the general reader with a broad interest in the subject." But let me assure the readers of this review that many historians of science have already learned much from it and many more will learn from it.

To the subjects that he touches in this substantial volume, Dijksterhuis brings accurate, careful, and up-to-date (at least to 1950) scholarship. For example, many of the results of Anneliese Maier's superb investigations into medieval natural philosophy are incorporated. The only points of vexation with this translation are that it costs the American reader $18.60 and that the translation took so long to appear.

Starting with the Pythagoreans, the author steps his way surely through the major phases of Greek natural philosophy, the scientific legacy of antiquity, and the science of the Middle Ages and the Renaissance; he concludes with an examination of the evolution of classical science through Newton. I think no other single volume makes so clear the relationships of ancient and medieval science and philosophy to the development of early modern physical science—in connection with the growth of the substantive ideas of classical (Newtonian) physics and with the underlying philosophical concerns.

In the epilogue Dijksterhuis discusses the nature and meaning of the "mechanistic" viewpoint of classical science which developed in the 17th century. He examines and rejects a number of possible ways of interpreting the "mechanistic" character of Newtonian science: (i) It is "mechanistic" because it conceives of the universe as a "machine," created by God; or (ii) it is "mechanistic" because the hidden mechanisms of nature are considered to be essentially the same kind of mechanisms as simple instruments or machines; or (iii) its theories are "mechanistic" because they describe processes as possessing the same inanimation as machines. Rejecting all of these as the most fundamental way of interpreting the mechanism of this early modern physical science, Dijksterhuis suggests another possible interpretation—that it is "mechanistic" in the sense that it is fashioned "with the aid of mechanics." While this definition of *mechanistic* may seem to be circular and to lead back to the original picture of the machine, he points out (page 498) that in fact this is not so "if one bears in mind that the science called mechanics had emancipated itself in the 17th century from its origins in the study of machines, and had developed into an independent branch of mathematical physics dealing with the motion of material objects and finding in the theory of machines only one of its numerous practical applications." In line with this suggested interpretation of classical physics as "mechanistic," Dijksterhuis is thus able to highlight the difference between medieval and early modern mechanics, namely, that, while the former on occasion uses mathematics and mathematical methods, the latter is essentially mathematical, that is, its basic concepts are mathematical. Many other wise things about the relation of Newtonian to modern science are briefly discussed, as the author brings his fine treatment to a close.

An excellent bibliography completes the book; unlike the main body of the text, it includes titles published as late as 1959. Thanks are due to the Oxford University Press for the handsome makeup of the volume.

MARSHALL CLAGETT
Institute for Research in the Humanities, University of Wisconsin