Purposive Social Evolution

Economic and Social Development. A Process of Social Learning. EDGAR S. DUNN, JR. Published for Resources for the Future by Johns Hopkins Press, Baltimore, Md., 1971. xvi, 328 pp. $10.

Dunn is another economist who, having tasted the apple of knowledge, sees his discipline as not competent to deal by itself with economic development and has ranged beyond the borders of economics in search of other formulas. Almost by the very nature of the approach he has taken, his recommendations for the science of the subject are also recommendations for social policy, albeit in broad terms.

Dunn's science braids three main strands: the systems concept, synthetic evolution, and Thomas S. Kuhn's paradigm changes in scientific revolution. Succinctly, the developmental process of nonteleological mutation-selection of new systems can fruitfully be viewed as a social learning process, sharp changes in which can therefore be viewed in turn as scientific paradigm shifts in the T. S. Kuhn model. Dunn's policy argues that to apply this view of change holds great promise for our social future and not to do so holds perils aplenty.

Those who are familiar with Campbell and Pringle (*1*), among others, will recognize the rationale for identifying evolutionary processes with learning processes, individual and social—and I, for one, basically accept it. This volume provides or suggests much of the additional detail of rationale that is necessary for transforming that broad theory into a form more directly applicable to the analysis of social change. In doing this the book is logically ordered, clearly written, entirely nonmathematical, and generally to the point. I find it somewhat overexplanatory and repetitious, though it may be properly dimensioned for readers not familiar with the background materials.

Dunn argues that evolutionary theory is good science, even though nonpredictive, since propositions about particular steps in it, including planned future steps, can be tested and falsified. Hence we should not hesitate to use it. His review of that theory and his general argument run as follows. Early living things evolved by adapting to their nonliving environment. As more numerous and diversified species developed, the significant environment of any one living thing came to be the matrix of other living things. Thereafter the criterial forces that selectively retained or rejected species were no longer exogenous to the biosystem but had become endogenous. When the biosystem itself provides the selective criteria, via interactions, ecological niches, and so on, it—and not merely organisms or species—constitutes a self-preserving system in its own right.

Furthermore, he argues, the whole biosystem then undergoes evolutionary change, under its own guidance, so to speak. Unlike the biological successions of already existing species in an ecological community, this ecological evolution has been little studied and needs much attention. Importantly, such an evolving community undergoes successive modification of its selective criteria. Since these criteria can also be viewed as values or goals, explicit attention to such matters must be made an inescapable central feature of the *science* of the process. Species adaptation can be specializing (closer fit to a particular niche) or generalizing (ability to fit a wider variety of niches). The latter is an improvement in adaptivity rather than adaptation. By virtue of his brain size man is conspicuously the most adaptive organism, and a central concern of the book is how to increase that adaptivity at the social level.

Because of this adaptive capacity, Dunn continues, man far more than any other system creates social systems which provide the selective criteria for the survival of individual members, types, cultural innovations, and even new social systems. Severe social problems now arise because analytically and practically we deal with subsystems piece by piece and seek to build or restore homeostatic systems, even if at changing levels of homeostasis. Viewed in the T. S. Kuhn model, such homeostatic adjustments are the simple puzzle-solving of normal science, made within an accepted paradigm of a given social system. But with our new perspectives (which Dunn hopes to forward materially by this book) we must make extraordinary science the normal order of society. This consists of social paradigm shifts, and so means experimentation with whole new levels or types of social systems, with possible concurrent shifts in social goals or values. It means that behavior-modifying and system-evolving behaviors must become the norm. Both are destabilizing and nonhomeostatic, at least in the short run. Growth motives must displace tension-reducing motives as social goals.

The book contains more meat than this oversimple summary suggests. It makes a significant contribution in an area which though neglected lies within the mainstream of contemporary scientific advance. Its scientific usefulness is much broader than its title may imply.

Despite my strong support of the overall venture, I have these reservations:

1) Although new forms of flesh-and-bones social systems can meaningfully be described as "social learning," I strongly suspect that T. S. Kuhn's conclusions about changing paradigms apply to analytical systems only, not to real ones. If so, substantial parts of this volume may need rethinking.

2) Relatedly, Dunn often seems to treat real matter-energy systems, analytical models of those systems, and behaviors of such systems as equally amenable to the same generalizations about systems. For example, he reifies (at least linguistically) "social learning," which is a system process or behavior, and talks as if it can itself know or do something—as on pages 232 and 242.

3) I wish Dunn had spent less space making promises for his social learning approach and more showing how to use it.

4) Although the thrust of the book transcends any one social science, Dunn thinks of social subsystems mainly as firms, industries, transformation and transportation systems, and so on. One wonders if he would say similar things about families, status groups, ethnic minorities, religious subcultures, or the military.

5) Although Dunn eventually distinguishes managed from ecological social systems, illustrating the latter with a freely competitive microeconomic market, he too long talks as if every social system had goals or purposes as a unit—beyond and distinct from the goals of its individual human subsystems.

6) Dunn is not clear about who or how many in the population must utilize this kind of thinking to produce significant results.

7) I do not think society has been as devoid of the conscious formulation of new social paradigms as Dunn implies. If Huxley, Wells, Orwell, and

others of their kind have not been throwing paradigm shifts in our faces for years, if only as types to avoid, then Dunn has not made clear what he means by the term.

Having completed his main theme, in his final chapter Dunn reviews numerous lines of thought that seem to converge into the central proposition of his book. The essential sensibleness of this chapter clarifies why, whatever the reservations, the book has a place in contemporary developmental social science.

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References

1. D. T. Campbell, "Blind variation and selective retention in creative thought as in other knowledge processes," *General Systems* 7, 57 (1962); J. W. S. Pringle, "On the parallel between learning and evolution," in *Modern Systems Research for the Behavioral Scientist,* W. Buckley, Ed. (Aldine, Chicago, 1968).

Renal Agents

Kidney Hormones. J. W. FISHER, Ed. Academic Press, New York, 1971. xviii, 666 pp., illus. $25.

The kidney was for a long time considered to be only an excretory organ; its function as a source of humoral agents acting inside and outside the kidney was only partially known or hypothetical. There are only a few renally produced chemical substances with well-defined biological activities, but the clinical implications of a better understanding of them are important in such common conditions as hypertension, renal insufficiency, and polycythemia.

This book is an evidence of how far the isolation, physicochemical characterization, assay, standardization, physiology, pharmacology, and pathology of renal hormones have progressed in recent years. It gives an up-to-date general review on renin, erythropoietin, prostaglandins, and other, still hypothetical, renal hormones. Although the review is not complete in every respect it covers the main topics. Composed of 25 chapters by 45 contributors, the book deals with the subject in a markedly well coordinated way, although some overlappings inevitably occur. The first two chapters, on renal blood flow and oxygen utilization, are less organically integrated into the main part of the book. The chapter on oxygen utilization is too general and the subject is presented in such a way that so important an aspect as the effect of hypoxia on renin release is not taken into account; the chapters on renin-angiotensin describe the main well-established and also some still controversial data (concerning renin inhibitors, for example) in an informative way. The most comprehensive and best coordinated are the chapters dealing with erythropoietin. The chapters on the prostaglandins reflect well all the controversies concerning these substances but also reveal their potential important practical implications. It is always difficult to coordinate a collection of articles written by different authors and to maintain a general line. This book has done it remarkably well. A more general style in writing the individual chapters should have been maintained, however, and the reader would have appreciated a short summary accompanying each chapter. In some places, established facts and hypothesis should have been better differentiated.

It is not the purpose of this book to describe new discoveries but to give a good general review of our present knowledge. The writing of the book was a worthwhile undertaking; it offers a comprehensive view of all important new data on this subject for workers in physiology, pharmacology, biology, biochemistry, and pathology and for those interested clinically in cardiovascular and some endocrine, metabolic diseases and in polycythemia.

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Goal-Directed Endocrinology

Cortisone. EDWARD C. KENDALL. Scribner, New York, 1971. xiv, 176 pp. + plates. $7.95. Scribner's Scientific Memoirs.

This is an autobiography of a scientist beginning with insights into the determinants in early life which produced a career in scientific research and ending with an account of his being awarded a Nobel Prize in 1950. Though his parents and his home life were deeply religious and puritanical, Kendall early tested the concept of divine retribution by shouting a profanity and awaiting the response. From Kendall's own pen it is clear that his scientific career was characterized by intensity of purpose and dogged persistence. Early in his career, Kendall decided to limit his activities to studying those biological phenomena that he considered important. He tells of his disillusion with the scientific activities in a research department of a prominent pharmaceutical company. Later, because of this, he took a position as a research biochemist in a large urban hospital, where he continued studies on the isolation of the active hormone of the thyroid gland, which he had begun at Parke Davis and Company. He was able to concentrate thyroid hormone and demonstrate its activity in clinical patients, but, as often is the case, the hegemony of the physician in clinical research became obvious. Kendall did not permit himself to be diverted in his quest for the isolation of thyroid hormone and steadfastly refused to participate in biochemical research which he considered to be irrelevant to his stated goals. In 1913, at the Mayo Clinic and in a new laboratory, Kendall began the successful isolation of thyroxine, which was completed in 1914. This important accomplishment reinforced his belief that research should be goal-directed and not fragmented by following every lead. The Mayo Clinic provided the environment for Kendall's successful activities. In this environment, Kendall continued to be productive, elucidating the chemical structure of glutathione, with Mason and McKenzie, in 1929.

The major portion of this volume is dedicated to a description of the discovery of cortisone, its therapeutic application, and the reception of the Nobel Prize for his discovery. At about the time adrenocortical extract had been isolated by Swingle and Pfiffner and Leonard Rowntree was treating patients suffering from Addison's disease with this extract at the Mayo Clinic, Kendall and his group became interested in the adrenal cortex. By agreeing to separate epinephrine from adrenal glands obtained from slaughterhouses for one of the pharmaceutical companies, Kendall was able to extract nearly 900 pounds of adrenals per week. This activity went on for several years. Late in 1933, crystals were obtained which were thought to be the active substance from the adrenal cortex. With the help of chemists in his section, particularly Harold Mason, the biological activity and eventually the structure were established. Kendall acknowledges the important observations