enormous, antibiotic industry in only about 5 percent of the book. Streptomycin is covered in its entirety in 1½ pages, and the authors manage to encompass chloramphenicol and chlortetracyline in a total of 17 and 9 lines, respectively. Something called "Vancomycin" is dignified with 15 lines. Another notable miss with the measuring spoon: 5 pages for cheese production (*sans* the chemical transformations) but 37 for sauerkraut and pickles.

Critical selectivity and predigestion of subject matter, together with the adoption of a pattern of synthesis and evaluation, would have enhanced greatly the value of the book, as would experience in the modern fermentation industry. As it stands, the book fails to consummate intimacy between the reader and the current real-life practice of industrial microbiology. Naturally, this particular criticism of Prescott and Dunn is less applicable to the *Advances*, in which people associated with the developments of the various specialized topics, and active in them, would be expected to convey authoritative and realistic pictures of their assigned topics. There is no denying that Prescott and Dunn have brought together a great deal of sundry information, and with its extensive bibliography, the book will certainly accomplish the purpose of putting the fermentation tyro on the trail. But it will not get him to his destination.

There is an unsubstantial, an unrealistic, quality to these works, as there is to many books dealing with commercial microbiology; they do not adequately represent the field. Covering virtually the whole scope of microbiology, these treatises still fail to tell exactly what products are in commercial operation, which organisms are preferred or used, and what process is being used, and at what scale. From Prescott and Dunn the novice would gather that microbial processes for butanol-isopropanol, acetone-ethanol,2, 3-butanediol, propionic acid, kojic acid, mold lactic acid, ustilagic acid, mannitol, fats, pigments, and innumerable other things are the substance of industrial microbiology today. They are not.

The student is likewise misguided when, from *Advances* he visualizes an image of applied microbiology composed of genuine efforts aimed at the development of nonsterile fermentations, preservation of foods by ionizing radiations, basic studies on mechanisms of biosynthesis, germ-free animal techniques, the antibacterial activity of phenol, and the like. On the other hand, the applied microbiologist will rightly protest that his interests are decidedly not restricted to utilitarian microbiology and that his dish is general microbiology, as this book presumes to be. In either case, the contents do not fulfill the expectations implied by the title. In other words, it is virtually impossible to deduce from these works the status of industrial microbiology's manifold activities and *modi operandi*. If not from these sources, where should the inexperienced person expect to find such information and to discern fact from fancy or reduction to practice from screening, research, and paper patents?

Another curious thing: despite their intention to be all things to all people, judging from the miscellany of topics these books contain, such sources consistently deny admittance to one of the oldest of microbiology's applications, namely, the commercial production of bacterial and viral vaccines, antisera, mold allergens, and other biologicals. It is hard to see why these sacred cows should be concealed from the individual who is interested in obtaining an accurate and a clear perspective of the utile microbe.

The flavor and the pulse of modern commercial microbiology has never been conveyed to readers. This vast technology has a definite personality; it has a rationale; it is unique. The organization of commercial microbiology laboratories; the conference approach to problems; the multispecialist composition of the attack teams; the turnover of problems at the laboratory level; the remarkable intelligence systems that industries have for picking up outside information pertaining to their current interests; the role of consultants; outside research grants; the philosophy and methodologies of screening and developmental research—these constitute the fiber of modern commercial microbiology. Still other facets desperately want codification: basic techniques and apparatus evolved for efficient, massive-scale output of routine microbiological testing; cost and profit analyses; the rationale of medium development and pilot plant research; the logistics of scale-up from pilot plant to factory; laboratory, pilot plant and factory equipment design and operation; systems for isolation from nature and the maintenance of enormous numbers of pure cultures of organisms; assays (microbiological, animal, and chemical); chemical extraction, purification and isolation, and structure determination on products; sterile packaging; control testing; time breakdown on fermentation cycles, sterility troubleshooting; phage resistant strains for plant production; the whole complex of animal testing of products for toxicity or efficacy.

The principles and procedures for the three basic contributions of industrial microbiology to the science of microbiology need to be spelled out: (i) the mutational development of high-yielding strains, (ii) the use of precursors to influence a fermentation, and (iii) the elimination of the diffusion barrier around the microbial cell.

These are the things that tell the true character of modern commercial microbiology. The kind of team effort that has shown itself to be so successful in the development of some of the extremely complex problems in industrial microbiology is the only way in which an accurate profile of this fabulous subject can be portrayed for others. And, for a realistic portrayal, the members of that team will need more than feel and first-hand knowledgeability—they shall have to be romantics.

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**Perspectives on Government and Science.** *Annals of the American Academy of Political and Social Science*, vol. 327. Norman Wengert, Ed. The Academy, Philadelphia, Pa., 1960. x + 204 pp. Paper, $2; cloth, $3.

The administration of the scientific programs of the federal government, the lines along which the administrative machinery may develop, the policy problems involved, and the relations between universities and government science are examined in the 15 papers of this symposium. Without listing all of the authors and titles, the flavor can be indicated by some samples: William D. Carey discusses the Presidential responsibility for budgeting; Senator Anderson considers the role of Congress and Senator Humphrey the need for a Department of Science; John C. Weaver discusses university aspects and Alan T. Waterman the role of the National Science Foundation in government-university relations; E. R. Piore and R. N. Kreidler describe recent developments in the relationships of government to science; several au-

thors review the work or problems of individual departments and several others some of the social and economic aspects of government science; John C. Honey points to shortcomings of the present government system and concludes that major improvements will require a greater sense of national purpose and a strengthening of the leadership role of the President.

Research and development support now accounts for a tenth of the national budget. The nation's economic and military welfare are widely recognized to be dependent on a growing base of science and technology. The administrative machinery with which the federal government carries out its scientific and technical responsibilities must therefore be of serious concern to government officials, natural and social scientists, and, indeed, to any serious student of government or science administration. For these groups, *Perspectives on Government and Science* is recommended.

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**Sons of the Shaking Earth.** Eric R. Wolf. University of Chicago Press, Chicago, Ill., 1959. xii + 303 pp. Illus. $5.

This excellent synthesis of Middle American geography, archeology, colonial history, and modern ethnology provides a broad view and valuable background information for students of Latin American affairs, ancient and modern. Chapters 1 and 2 present the geographical and biological diversity of Mexico and Guatemala. Wolf places much emphasis (some readers may consider it unduly heavy) on the role of evolution and environmental determinism in the development of physical types among the American Indians after they arrived in the New World. "Mutation, drift, and genetic recombination, the forces of natural selection were continuously operative." Wolf restates the hypothesis that cold may modify human stature by stimulating the adrenal glands, while altitude, because of decreased oxygen intake, may favor massive chests and lungs. Chapter 3 stresses the value of linguistic studies in reconstructing ancient history and "the direction of the flow of culture" in Middle America.

Chapters 4 to 7 summarize the archeology of this area: the early hunter-gatherer stages; the incipient, then fully developed horticultural stage; the theocratic period when "egalitarian life of the simple farming community yields to increased complexity"; the years between A.D. 750 and 900, which "shook the old world order to its foundations"; and the final epoch, when the Mexica Aztecs brought militarism to its culmination.

The Spanish conquest (chapter 8) came when "the time was ripe for a redress in the balance of power in Middle America." Two Spanish trends—one toward warfare, one toward industry and trade by a town-based *bourgeoisie* — were colliding in the Old World when this new American frontier suddenly favored the otherwise doomed warrior-adventurers and, thus, ultimately led to Spain's downfall. Chapter 9 on the colonial period, points out that "the goal of the Indian noble was to consume wealth commensurate with his social position. The Spanish colonist, however . . . wanted to convert wealth and labor to salable goods." Wolf here describes Spanish enterprises—mining, agriculture, stock-raising, and manufacturing. Chapter 10 tells how the 17th-century depression ended Utopian dreaming and "Middle America again retreated into its countryside." Chapter 11 on modern ethnology states: "To fulfil the goals of his revolution, the mestizo had to go beyond land reform and beyond Indianism to an active transformation of society. . . ." The economic instruments of this transformation were industrialization and mechanized agriculture; the ideological instrument was nationalism.

On the whole, this valuable analytical synthesis is well written; in spite of the compression of its enormous scope into 300 pages, the reader does not feel that he is being hastened through a cafeteria line on a busy day. There is, however, a curiously abrupt alternation of highly poetic and eloquent phrasing on the one hand and purely factual, straight-forward reporting on the other. The language sometimes seems a little pretentious, like political oratory, in contexts that scarcely warrant this style. But the book is accurate and thoughtful, a welcome and much needed addition to the growing number of general studies interesting to student and layman alike.

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**Economics and the Policy Maker.** Brookings lectures, 1958–1959. Brookings Institution, Washington, D.C., 1959. xiii + 209 pp. $2.95.

The Brookings Institution is to be commended for the several series of lectures it has held since 1954. Designed for audiences of professional specialists and public officials, the lectures contribute to the wider understanding of the uses of social sciences in raising the level of decision making. The present volume discusses the role of economics in some areas of national policy.

The goal of maintaining growth and stability in the American economy has become obsessive. It is not surprising, therefore, to find that four of the eight lectures are variations on this theme. Gerhard Colm discusses the tasks of federal stabilization policies, with emphasis on the adjustments of taxes and expenditures. Robert V. Roosa presents a brief for achieving stability through controls over the banking system—a policy that today is more often treated as a rival than as a complement to fiscal controls. Neil H. Jacoby gives a comprehensive survey of the adjustments in national economic policies that would stop creeping inflation. The late Sumner H. Slichter, motivated by the desire to examine the contribution of labor union activities to inflation, scrutinizes the union.

The other lectures are on the applications of economic analysis in business planning (Sidney S. Alexander), on taxation (Louis Shere), on the mixture of economics and law in the enforcement of the antitrust laws (Mark S. Massel), and on problems of the underdeveloped countries (Everett E. Hagen). Hagen seeks to allay currently popular fears concerning the overpopulation of the earth.

The book should appeal to all serious students of public affairs, even though, in some places, the level of discourse is suited only to professional economists.

Like other experts, economists wish that politicians and administrators would pay more attention to accepted economic knowledge in the design and execution of economic policies. But to the age-old problem of the interaction of the roles of philosopher and ruler, the present volume makes no real contribution, despite its many penetrating observations. One of these is Gerhard Colm's distinction between economics