

would like to see more fully explained. For example, the discussion of the cosmic time scale, does not mention the fact that a world model *must be assumed* before an age can be assigned to the expanding universe from our knowledge of the present expansion rate. Furthermore, the most important method of dating stars in our galaxy—the use of H-R diagrams of galactic clusters—is not mentioned. Also, Figure 6 on page 87, which shows the evolution of stars of solar mass, is somewhat misleading because stars of 1.2 masses are very probably not operating on the carbon cycle as shown, but rather generate energy by the proton-proton chain. For this reason, it is quite likely that these stars do not have a convective core. If a convective core were present the characteristic Hertzsprung gap would occur in the diagram. Its absence is a notable feature of the H-R diagram for globular clusters. Finally, it is nowhere mentioned that the track shown in Figure 6 is for a star with very low metal abundance such as the stars in globular clusters. Stars with a normal chemical composition (like the sun) will have evolutionary tracks which differ greatly from the track shown.

Bok's book, although not as detailed or as carefully written as many professional astronomers might wish, should appeal to the lay reader, especially if it is used in conjunction with more comprehensive books such as *The Milky Way* (Bok and Bok) or the other works listed in the extensive bibliography at the end of *The Astronomer's Universe*.

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The Population Ahead. Roy G. Francis, Ed. University of Minnesota Press, Minneapolis, 1958. x + 160 pp. \$3.75.

"Man knows more than he thinks he does," says Roy Francis, the editor of this symposium volume. Unfortunately, it is often difficult to apply what is known to some of the acute social and economic problems confronting the modern world, because a good deal of the existing store of knowledge is not really in the public domain. Though not under security wraps, it is virtually inaccessible because it is presented in the strange jargons of scientific specialization. It may be food for pedantic thought, but

it is not "Gerberized" to titillate the intellectual palate of the layman. Francis' solution for this problem is "the desegregation of knowledge." Such a term, to be sure, is not now current: "in today's lexicon one 'segregates' on the basis of skin color, not of academic hue." The segregation of ideas, by preventing knowledge from being an effective power for reform or reorientation, can be devastating in its effects.

An area gravely befogged by segregated knowledge is that of population dynamics. The human race is in the midst of an explosion of people the like of which has never occurred before. The rate of this explosive increase—1.5 percent a year—would not impress a financier. Yet it means that when next week's edition of *Science* is distributed, there will be nearly a *million* more human beings on this earth than there are today. In the book under review, P. K. Whelpton notes that if the one-third of a billion human beings presumed to have been living at the time of Christ had increased since that time at a mere 1.5 percent a year, the present population of the planet would be more than a million persons per *square foot* of the earth's land surface. Clearly, this far outdoes the mediaeval concern over balancing angels on the head of a pin.

The Population Ahead is a laudable attempt to desegregate knowledge regarding the population question, which is now cooped up behind the conceptual curtain raised by social scientists, economists, nutritionists, demographers, geographers, and anthropologists. In 1957, the University of Minnesota's Center for Continuation Study (a sort of perpetual idea-desegregating apparatus that ranges widely over many domains of knowledge) brought together a panel of experts and *begged* them to talk in plain English to each other and to a participating audience of several hundred. The result was by no means an intellectual Little Rock. Everybody was eager to live and let live, and there was a very free exchange of ideas, but some of the audience may have been on the verge of conceptual anoxemia. The wide range of views presented does throw considerable light on the population problems, even though the focus is not always sharp.

The question which stood out as the theme of the conference was, "What constitutes an optimum population?" Though opinions vary greatly, this is a question which deserves far more thought than it is now getting. Even in most fortunate America, it is by no means an academic question. The idea is abroad

that by 1975 two-thirds of the population of the United States (perhaps 235 million) will be living in the 165 to 170 standard metropolitan areas, and that this will necessarily be a good thing. Well, will it be or not? Is there a more favorable distribution of people, and what might be done to bring about such a distribution in a free society? These are the questions that are not asked, perhaps because nobody wants to look straight at them.

One thing is certain: population is definitely everybody's business, and the most complete desegregation of knowledge is necessary if what man knows about this subject is to be put to work short of disaster. If the population explosion continues at the present rate, something will have to give. And some of the things which will inevitably give, and before very long—in the United States as well as everywhere else—are the level of living and freedom of thought and action and initiative. Ancel Keys is sure that the earth can provide a survival diet for a good many billion people. Before we test that conclusion let us try to reach some decisions regarding the kind of planet we want to live on.

The varied ideas of nine experts, plus the supporting commentary by a somewhat larger chorus, that make up this symposium volume hardly give a microscopically clear image of the problem. But the book contains more than a K-ration of food for thought.

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The Earth beneath the Sea. Francis P. Shepard. Johns Hopkins Press, Baltimore, 1959. xii + 275 pp. Illus. \$5.

Francis Shepard's newest book deals with the vast area, three-fifths of the earth's surface, which lies under the sea. He writes in a simple, direct style which requires no specialized vocabulary from the reader, yet he covers salient aspects of all of the basic geologic problems one encounters beneath the sea. Laymen will find this book well worth reading. In it they will find discussion of many things which are readily observable near the sea—coastal erosion and engineering, currents, waves, and coral reefs. The more exotic phenomena, such as submarine mountains and canyons, are treated in an equally readable manner.

Scientists active in marine research