

Letters

Circumnavigated Planet

In a recent issue [*Science* **133**, 1207 (1961)], René Dubos argues with his accustomed eloquence for a rededication of scientists to the purpose of enlarging human understanding. So, he argues, scientists can regain the public esteem that once was theirs. But I wonder if Dubos is not yearning for a past that has gone forever. The trouble, I think, is not that we have overemphasized the practical aspects of science—a matter on which, as Dubos is well aware, the savants of the 17th and 18th centuries had emphatic opinions—but rather that the limitations of science have now become painfully apparent.

Two and a half centuries ago, it was the potentialities of science that were beginning to claim attention. In glorifying science, Fontanelle proceeded from the belief that Cartesian principles of reasoning would affect not only physics but ethics and religion and philosophy as well. Though Fontanelle himself was restrained in his expression of this point of view, the thinkers of the Enlightenment developed the idea explicitly. No one put the matter more clearly than Condorcet, who argued, in Bury's words, that "all errors in politics and ethics have sprung . . . from false ideas which are closely connected with errors in physics and ignorance of the laws of nature." This analysis, so wide of the mark, deceived even those whose professional competence might have been expected to give them keener insight. Thus Priestley predicted that, thanks to science, the future of the world must be "glorious and paradisaical beyond what our imaginations can now conceive." No wonder science was honored, when such promises could be made in its name!

Such promises can be made no longer. The Eichmann trial daily reminds us that amid the brilliant scientific triumphs of the 20th century, a great

nation descended to a level of savagery unprecedented in history. We may read in the same newspaper of a spaceship ascending to Venus while the United Nations flounders in a storm that may end in disaster. The problems that confront mankind today are more fearsome and more urgent than they have ever been—and science is humbled before them.

That science is an essential activity in our modern world cannot be doubted; nor need it be doubted that science is in itself a fascinating, enlightening, and rewarding pursuit. Yet it is a planet that has been circumnavigated. Its limits are known. It is not through science that men will come to live in peace and dignity, if they ever do. We scientists might as well forget about the "ancient titles of nobility" and reconcile ourselves to the fact that the important questions are not ours to answer.

FLORENCE MOOG

Department of Zoology,
Washington University,
St. Louis, Missouri

Population Center

The issue of *Time* for 21 April 1961 (p. 19) contains the following statement: "Last week, after analysis of the 1960 census results, Commerce Secretary Luther Hodges announced that a point on Kleiboeker's farm has become the population center of the U.S.—defined by Hodges as the spot at which the nation's 179 million people can convene with the minimum travel mileage."

This definition of the center of population was repeated in other publications of regional and national circulation after Secretary Hodges' an-

nouncement. Unfortunately the definition is erroneous, although it is given prominence in various U.S. Census publications of 1910 and 1920 and in various textbooks on sociology.

In 1930 I published an article in the *Journal of the American Statistical Association* [**25**, 33 (1930)] demonstrating the falsity of this definition or characterization of the center of population. This article caused considerable discussion at the time, internationally as well as nationally, which was summarized by the editor of the same journal in December of that year [**25**, 447 (1930)].

This summary included a copy of a letter from W. M. Steuart, then director of the census, stating that my criticisms were valid and that the erroneous characterization of the center of population as the point of minimum travel would be eliminated from future census publications. It is unfortunate that it has now reappeared, after an interval of 30 years, with the prestige of the Secretary of Commerce behind it.

The fallacy of the statement is easily shown for the very simple case of a population of three individuals, *A*, *B*, and *C*, living along an 8-mile straight road (see Fig. 1).

The center of population (center of gravity or balancing point) for the three men is at *X*, 3 miles from *A*. In order to convene at this point, the three men would have to travel $3 + 2 + 5$, or 10 miles. If, however, they agree to meet at *B*, their total travel will be only $1 + 0 + 7$, or 8 miles, a saving of 2 miles. Furthermore, if *C* becomes restless and decides to move farther away from his neighbors (this is analogous to the recent shift of population to California), the center of population will also move in his direction, to preserve the balancing point, but the point of minimum travel for the three to convene will always remain at *B*, regardless of how far *C* may wander. Thus, "minimum travel mileage" is not in any sense a characteristic of the center of population.

If instead of the above linear distribution we have the three men located at the vertices of an isosceles triangle, with *A* and *B* at the base points and *C* at the vertex, the posi-

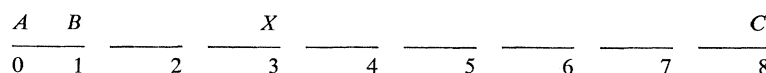


Fig. 1. Linear distribution of three individuals living along an 8-mile straight road.