Letters

Drift Theory: Antarctica and Central Asia

The discovery of early Triassic tetrapods in Antarctica, recently reported by Elliot *et al.* (18 Sept., p. 1197), is an important event for paleontology and geology. As pointed out by these authors, the occurrence of *Lystrosaurus* and some other more broadly similar faunal elements in Antarctica, South Africa, and India is evidence that those crustal segments were then continuous, and they are interpreted as parts of predrift Gondwanaland. Elliot *et al.* also mentioned that *Lystrosaurus* and other generally similar faunal elements likewise occur in Sinkiang, that is, in what is now central Asia, but they did not discuss the bearing of that fact on paleogeography. Application of their reasoning would indicate that central Asia also was then in continuous (not necessarily direct) connection with Antarctica. However, proponents of Gondwanaland have hitherto excluded central Asia from that former land mass. Some recent forms of drift theory indicate a major lack of connection between predrift Antarctica and central Asia, although the earlier hypothesis of Wegener had them separated only by shallow epeiric seas. Accepting the Antarctic discovery as strong support for drift theory, we may still have to reconsider the concept of Gondwanaland and some other paleogeographic and biogeographic points.

GEORGE GAYLORD SIMPSON
Department of Geosciences,
University of Arizona, Tucson 85721

Cleaner Air—Fewer Cars

However obvious the benefits of cleaner air may appear to some, a savings of more than $2 billion annually should be sufficient to convince everyone that an immediate and effective reduction in air pollution is essential. In "Air pollution and human health" (21 Aug., p. 723), Lave and Seskin estimate that, in terms of morbidity and mortality, a 50 percent reduction in air pollution would reduce health costs by more than $2 billion annually. But human beings seem to respond only to situations of crisis proportions; they appear to adjust to slowly changing circumstances of incredible unpleasantness. For example, suppose that on some particular day smog in Los Angeles killed 30,000 people. Obviously, this situation would create a storm of protest and would receive immediate attention. Yet, on certain days when the smog is bad, that city cautions schoolchildren to minimize exertion in order to protect their lungs. And these warnings pass by without significant comment. It is time for the federal government to seize the initiative and take steps to reduce air pollution before a major disaster occurs.

Since the automobile has been identified as an important contributor to air pollution, any improvement in its efficiency of operation would mean a reduction of emissions from that source. (Efficiency here is defined as passenger miles by any method per quantity of pollutants.) The efficiency can be increased by either raising the number of passenger miles or by lowering the quantity of pollutants, or both.

Expenditure of vast amounts of time and money (for development of new engines, fuels, and antismog devices) is not required to realize *immediate* increases in efficiency. If driving an automobile is made more expensive and less convenient, then people would be inclined to ask themselves such questions as: Is this trip necessary? Can I walk? Ride a bicycle? Ride with someone else? Take someone else with me? Answers to these questions could result in fewer pollutants and increased passenger miles.

Two ideas, neither new, for raising the expense and lowering the convenience of automobiles could bring rapid results if implemented by law. First, why not increase the gasoline tax to 50 cents or even $1 per gallon? Not only would this new revenue be available for the development of good mass transportation, but people would be encouraged to use automobiles more efficiently. Furthermore, taxes would be paid in proportion, more or less, to the amount of pollutants created. Second, restrict the use of certain streets during particular periods of the day to automobiles that contain a minimum number of passengers (why not three?). Give violators a choice between an expensive ticket or waiting by the roadside until the prescribed period had passed. Such a regulation would do much to increase multiple passenger use of an automobile.

Admittedly, these two measures are not a final solution to the problem. That must await a good mass transit system and, to some degree, further technological development of engines and fuels. But these steps should yield dramatic results pleasing to everyone: the citizen will breathe less polluted air and face fewer traffic jams; government will gain a large source of new revenue; the automobile industry probably would not have to face a potentially costly suit concerning antismog devices being brought by several states; and the oil companies can ease their concern for our increasing dependence on foreign oil, since reduced consumption means longer life for our own resources.

H. F. BEZDEK
Marine Physical Laboratory,
Scripps Institution of Oceanography,
San Diego, California 92152

Geologists Prefer Earth Studies

In his editorial "Lunar science and planetary history" (18 Sept., p. 1159), Preston Cloud states: "It will be hard to find an informed scientist of any breadth who views this last reduction of the Apollo program with anything short of dismay." I am not sure he means to include geologists in the category—"informed scientist of any breadth"—but I think he does, since the rest of the article refers to geology. If all geologists were asked: "Do you know better ways to spend $24 billion on geology than by sending a dozen or so Apollo flights to the moon," I venture to guess that a majority would answer in the affirmative.

I was especially interested in a ref-

erence to the possibility that a study has profound implications for our understanding "perhaps for origin and distribution of ore deposits," as I have recently been working on this very subject (*1*). In this study I come to the conclusion that the constituents that form the metal deposits probably originated in the earth's upper mantle, at a depth of some 25 miles below the surface. I would therefore be much more interested in knowing the constitution of the earth's upper mantle, 25 miles below us, than the constitution of the moon, 250,000 miles away in space.

A sidelight of my study of the metal provinces was that one particular area in southern Arizona, partly overlapping into New Mexico, has a record of production plus probably reserves of copper of some $26 billion of gross value. This is by far the greatest known concentration of value of nonferrous metallic wealth in the United States. It will be noted that this total gross value is very nearly equal to the total cost of the entire Apollo program including development, research, and facilities ($24 billion). On the other hand, the *net* value of the metallic wealth is very much less. In fact, I doubt very much if the *net* value of all the known metallic wealth of the United States is equal to the cost of the Apollo program.

JAMES A. NOBLE
1474 East California Boulevard,
Pasadena, California 91106

Reference

1. J. A. Noble, *Geol. Soc. Amer. Bull.* **81**, 1607 (1970).

Appalachia: Focus of Health Care

As a member of the Student Health Coalition whose activities were discussed in "Appalachia: Two approaches in student summer health projects" (21 Aug., p. 746), I would like to clarify the relationship between our project and Vanderbilt University. Goldhaber implied that there was a lack of cooperation on the part of the university. In actual fact our project received considerable support from a number of faculty members and the offices of the dean of the medical school and the chancellor of Vanderbilt. . . . The lack of cooperation alluded to does not pertain to individuals but to the institutional framework. The medical school has investigated but not committed itself to the academic questions involving comprehensive health care. A faculty committee recently issued a report concerning the university's role in health care and declared, "It is really not a question as to whether the Vanderbilt Medical Center can afford to hire such a Director [for comprehensive health care programs] but rather whether it can afford not to and still provide leadership for or even remain in the mainstream of American medicine in the future."

We are hopeful that the recommendations of this report can be realized, and that the university will be increasingly responsive to the need for research in new methods of urban and rural health care delivery.

WILLIAM W. DOW
Box 40, Station 17,
Vanderbilt Medical School,
Nashville, Tennessee 37203

Federal Largesse

In Greenberg's article ("Daddario: Scientific community's friend on the Hill is leaving," 25 Sept., p. 1291) I believe there is a misconception of the power of the appropriations subcommittees vis-à-vis the authorizing committees. He suggests that the legislative process consists solely of doling out money and that a member who is not on the appropriations committees might just as well stay home. This isn't so. The overview committees for federal programs do exercise great influence, particularly when they also handle annual authorization bills. The Joint Committee on Atomic Energy, the Senate and House Armed Services Committees, and the Space Committees of each body have had a major impact on science, research, and development. Senator Lister Hill chaired the Labor and Public Welfare Committee and thus influenced the course of the National Institutes of Health.

An objective analysis would show substantial effects of the National Science Foundation authorization hearings on appropriations this past session—only the second year they have been held. It seems clear that these annual hearings in the House and Senate—given the direction and momentum of the Daddario era—will have a key role in the determination of the future federal patronage of science.

RICHARD A. CARPENTER
Legislative Reference Service,
Library of Congress,
Washington, D.C. 20540