Letters

Alaskan Gas and Human Rights

I am hardly encouraged by Luther J. Carter's observation, in his article "Alaskan gas: NEPA brings out a strong new pipeline applicant" (News and Comment, 3 June, p. 1068), that the U.S. government is acting in a less arbitrary way than it did with the trans-Alaska oil pipeline. The "Alcan" route, recommended by the environmental staff of the Federal Power Commission (FPC), has all the major drawbacks of the Arctic–Mackenzie Valley proposal. Approval of either route would show that economic and national self-interest prevail despite rhetoric to the contrary, specifically with regard to President Carter's principle that no Indian tribe will suffer as a result of energy development and his commitment to human rights.

The FPC, in recommending the two overland routes, did not hear one representative from a native organization, nor did it mention the native peoples' claims anywhere in its voluminous report. The Council of Environmental Quality (CEQ) did hear representatives of the Denes (natives of the Mackenzie Valley) and the Yukons (natives of the Alcan area) testify that to build an overland route through their lands now could be nothing short of genocidal. In fact, the testimony revealed that, given the established infrastructure along the Alcan highway, the social impact could be even greater on the Yukon Indians than on the natives of the Mackenzie Valley.

The CEQ hearings also showed that aspects of British Columbia Supreme Court Justice Thomas J. Berger's findings in the Mackenzie Valley pipeline inquiry hold for the Alcan route as well. Not only questions of protection of the environment are involved, but, more important, the future of Northern peoples. The pipeline would not provide meaningful or ongoing employment to native people but, rather, would undermine their economy, allowing them no choice other than the industrial system and no control over entering or leaving it. Berger claimed that, to keep environmental impacts to an acceptable level, construction and operations should proceed only under careful planning and strict regulation. He concluded (and Project North, a Canadian interchurch project on Northern development concurs) that this can result only after a settlement of native claims and a sufficient time lapse to allow for the establishment of new institutions and programs to ensure implementation of those claims.

In allowing Northern development to be a matter of self-determination, respectful of local values and culture, the Canadian and U.S. governments have perhaps a last major opportunity to reverse their traditions of colonialization. Were such a just settlement reached, the pipeline, when built, could be a monument to real cooperation and human development, not another testimony to the power of heedless development and exploitation.

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Science's News Writers

I hope you get a sackful of mail in angry response to the remarkable letter from R. Grantham (10 June, p.1154). The choppy rhythm of the correspondent's prose, and his awkward use of the passive voice, lead me to think that it may be a joke; I will proceed as though I have fallen for it.

Science's news writers are remarkably concise and they are not obscurantists but clairists. (Their windedness is, incidentally, assessed by the number of words they use in total and not by the number of sentences into which their prose is divided!) The reporting in your journal is such a distinguished combination of density, grace, and comprehensibility that I have used it for teaching examples. The only obscure thing about the *Science* news staff is how you can hold on to such uniformly talented people in a world desperate for good writers who can cope with a complex world.

I am pleased to add Grantham's letter to my small collection of examples. It not only illustrates the common fallacy that "the only things that count are what can be counted" but also offers an unusual demonstration of prose crippled in the name of better writing.

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Credit for New Ideas

Publication in established journals has long been the chief avenue by which scientists receive credit for their research accomplishments. However, several separate developments in recent years underscore the fact that this system falls short when it comes to credit for new ideas. These new developments include (i) court rulings under the Freedom of Information Act making publicly funded research proposals public property; (ii) an ever-increasing volume of manuscripts, resulting in delays in publication at most journals; (iii) increasing concern on the part of scientists that "peer panel" review of grant applications provides an opportunity for plagiarism of ideas; and (iv) project plans that are deliberately vague or based on ideas already researched by the scientist and that offer little of real meaning to scientists, administrators, or policy-makers.

I believe the time has come for crediting ideas. A documentation system, the Smithsonian Science Information Exchange (SSIE), is readily accessible to the scientific community. Entry of a project statement in SSIE would constitute publication. Date of entry would establish priority, as with date of acceptance or publication in scientific journals.

The proposed concept is somewhat similar to the patent system for inventions. However, the judicial process involved in patent granting would not be necessary, for scientists who fail to give appropriate credit to others soon find there is virtue in following the accepted standards of the scientific community.

Credit to the idea-originator would not mean that the idea has more merit than the research itself. Some ideas could be shot down without doing any research, which would save valuable resources. In other cases, only research could demonstrate whether an idea could hold up under rigorous testing. If a different person does the research, that person

would be credited with the publication of results but would give credit to the idea-originator. Knowing that credit is assured for original ideas, scientists might be willing, perhaps even eager, to record meaningful project plans in a documentation system. The crediting of ideas could then be as matter of fact to scientists as today's literature citations.

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The Amazon Basin, Another Sahel?

Deforestation of the Amazon Basin is being accelerated by the Brazilian government. The reasons apparently include the desire to resettle refugees from populous northeastern Brazil, which often suffers from severe drought, and to open the territory for development, as was done in the North American "West" in the mid-1800's. The trans-Amazon highway is one of a number of projects intended to speed the development.

The removal of the Amazon jungle can be expected to produce extreme climatic effects. It could transform the basin, a region larger than the continental United States, into a dry savannah similar to northeastern Brazil or the African Sahel. Southern Brazil and Argentina, areas of rich agricultural land, would likely be affected also.

The area of the Amazon Basin is 7×10^6 square kilometers (*1*). The water outflow from the basin is 5.5×10^{12} cubic meters per year (*2*) and corresponds to only 80 centimeters of rainfall per year. Most of the net inflow apparently results from a few frontal storms that occur in the months from February to May, when Antarctic air occasionally reaches the basin. The remainder of the 2 to 5 meters of annual precipitation is derived from recycled transpired moisture. The jungle trees with their deep roots act like giant pumps taking water from the water table—often more than 2 meters below the ground surface—and transferring it into the air from which it falls again as rain.

Maranjo Island, at the mouth of the Amazon, strikingly shows the dependence of climate on tree cover. The eastern half of this low island, which is about 300 kilometers in diameter, lacks trees because of high soil salinity, which is due in turn to the presence of a lens of ocean salt water; trees grow only on the river levees, which are elevated so that the tree roots do not penetrate the saline substrate but are watered by the fresh surface flow of the Amazon (which is underlain by salt water). This eastern half of the island is dry savannah and has a long and severe dry season. The western half of the island is heavily forested and receives almost daily rain throughout the year. The control of weather by the jungle was apparent when I flew over the island during the dry season. While thunderstorms built up over the forested half of the island, none appeared over the treeless half. The buildups were sharply delineated by the line of jungle, a fact dramatized by the antics of our aircraft whenever we crossed the boundary between trees and savannah.

Mistakes made by removing the Amazon jungle could not soon be corrected. The jungle is a climax forest; once removed, it could take thousands of years to regenerate and a substantial part of its uniquely varied biota could be permanently destroyed.

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Mass Transit Versus Highways

As one who has always believed in viewing the rail versus highway issue with objectivity, I would like to make some remarks concerning a recent technical comment in *Science* (11 Feb., p. 595) by Charles A. Lave. Lave contends that rail transit is an energy waster compared to highways. He arrives at this conclusion by comparing the construction energy invested in San Francisco's Bay Area Rapid Transit (BART) system to the energy required to construct an urban freeway with an equivalent capacity, that is, 130,000 daily travelers. His analysis leads him to conclude that building BART required 25.2 times as much energy as would equivalent freeway construction, and that we should therefore refrain from building rail transit and encourage further highway construction. Lave's analysis contains highly questionable assumptions—both conceptual and technical.

First, BART is not "typical of other modern rail systems," as the author claims. It includes the longest underwater rail tunnel in existence (3.6 miles) with energy costs that represented almost 10 percent of the energy spent on the entire BART system. Furthermore, the cross-sectional tunnel area required to accommodate the wide-gauge BART cars increased the cost of tunneling above what would be normally required for a rapid transit system.

Second, BART and highway capital costs are inflated by Lave to 1974 dollars, while the factor he uses to convert invested dollars to Btu's is based on a 1963 dollar conversion rate. This has the effect of overstating BART's construction energy requirements. When the proper adjustment is made, the time at which BART begins to realize net energy savings is far sooner than that predicted by Lave: 15 to 40 years, depending on assumptions, compared with the 168 to 535 years estimated by Lave.

Third, a highway construction cost figure of $932,000 per lane-mile is not a realistic estimate for urban freeway construction. For example, the cost of providing another San Francisco Bay Bridge today would be far more (perhaps as much as 40 times) than the $47 million derived using Lave's estimate of highway cost per lane-mile. Current urban highway construction costs run closer to $4 million to $10 million per lane-mile or 5 to 10 times Lave's figure.

Finally, Lave does not mention light rail transit in his rail versus highway comparison. Yet a large percentage of world rail transit systems are of the light rail variety and are appreciably less costly than the main line commuter type of rail technology represented by BART. The cost of light rail systems—and their construction energy requirements—can be 50 to 75 percent less than the cost of a full heavy rail system.

Energy efficiency is an important, but not the sole, objective or criterion in the selection of a transportation mode. Service qualities such as speed, reliability, and comfort; environmental impact on urban neighborhoods and air quality; and the ability of a system to shape land use over long periods of time also enter into such decisions. It appears that some economists still do not accept that the relative merits and demerits of individual transportation modes (many of which cannot be translated into dollar values) must be studied in the context of specific site conditions and that conclusions derived from one site are rarely, if ever, generally applicable.

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