Letters

International Science

Continuing international political unrest now appears to threaten a most important facet of our modern civilization: the free exchange of science and scientists between the East and the West. Individual countries have for years placed restrictions on exchanges related to national security matters, but now it seems that the exchanges in basic sciences that we have been able to preserve may be curtailed. Two specific problems deserve the attention of all scientists who believe international science is one of the remaining keys that could open the door to world peace.

First we should consider the United Nations Educational, Cultural, and Scientific Organization (Unesco). The U.S. government has announced that it will withdraw support from the organization within the year because of dissatisfaction with many facets of Unesco operations—fiscal, ideological, and managerial. Fortunately, there is a chance that the U.S. decision could be reversed (*1*), and many countries, including nations of both the Eastern and the Western blocs, are hoping that the United States will change its position. A Canadian official has stated (*1*), "As is well known, we share some of the U.S. misgivings about the activities and initiatives of the organization. But we believe that there can be a better possibility of setting it right from within rather than from the outside." Surely most scientists who have seen Unesco programs result in new and expanded opportunities for international scientific exchange will recognize the wisdom of this view and will also hope for a reversal of the U.S. decision. But it is not enough to hope. We should put on what pressure we can and write to our congressmen, scientific societies, and even the President.

Second, a more specific threat to international cooperation in the earth sciences has been suggested. The International Geological Congress, now in its second century of existence, will hold its 27th session in 1984. The meetings and excursions will be in the Soviet Union, with headquarters in Moscow. The congress could be an immense success and a great opportunity for Western geologists to have fruitful association with their Soviet counterparts. Americans who attended the Sixth International Symposium of the International Association on the Genesis of Ore Deposits, held in the Soviet Union in September 1982, reported it to be a fine professional and sociological experience. They came away with a feeling that the good rapport developed (or renewed) with the Soviet geologists (and many ordinary citizens along the way) could only have inspired respect, friendship, and trust among those concerned.

Recently, however, some geologists (*2*) have declared their intention to stay away from the 1984 Moscow congress in protest against the recent Korean airline disaster and the Soviet invasion of Afghanistan. This is, of course, their prerogative, but I sincerely hope that their decisions do not precipitate a ground swell of support for a boycott. Those who oppose a boycott should make their opinions known. We geologists have a unique opportunity this year again to help improve international relations in a personal way.

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Animals and Research

The briefing by Jeffrey L. Fox (News and Comment, 13 Jan., p. 151) gives the impression of a resigned if not unconcerned reaction of Massachusetts scientists to the state prohibition on use of pound animals. On the contrary, this and other such moves on the part of antivivisectionist, "animal rights," and other antiscience groups constitutes one of the most blatant reactionary legal actions in recent history and is so recognized by scientists in Massachusetts.

That this travesty was brought about by an organization calling itself "Protect Our Pets" is a real anachronism, since irresponsibility of pet owners is the sole cause of the horrendous problem of stray dogs and cats inundating the pounds and the cities they serve. It is in recognition of this irresponsibility that the majority of the states do allow the release of unwanted pound animals to responsible research and educational institutions for use to improve the health of both humans and animals.

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The present Animal Welfare Act (News and Comment, 3 Feb., p. 468) was carpentered by negotiation and compromise between the scientific community and other interested constituencies. I know. I was there.*

Given enough money for implementation, it works. Don't fix it.

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Sakharov Appeal

The following letter by our distinguished colleague Andrei Sakharov was presented to various delegations to the 35-nation Conference on Confidence- and Security-Building Measures and Disarmament in Europe, which convened in Stockholm on 17 January 1984.

Participants in this distinguished conference will doubtless devote significant attention to the question of human rights including the fate of prisoners of conscience, matters closely linked to international security.

At this time I am obliged to appeal to the Conference participants concerning a most urgent personal problem. In September 1982 my wife Elena Bonner submitted an application to travel abroad for medical treatment and for a visit with her mother, children and grandchildren. She is quite ill. In addition to her persistent eye disease, she has developed cardiac problems. She suffered an infarct in April 1983. Subsequent attacks in May, June and October damaged additional heart tissue. Her condition has become life-threatening.

Treatment for my wife in the Soviet Union where she has been subject to severe persecution, slander and KGB interference cannot be effective and could prove dangerous in our opinion. For all practical purposes, she has been deprived of medical care. Only a trip to receive medical treatment abroad can save her life, and mine as well, since her death would mean my death.

On November 10 I sent a letter to Soviet Head of State Yury Andropov asking him to

expedite a resolution of this problem. We have received no answer to my wife's application or to my letter. Two years ago international support helped us in our struggle for the emigration of our son's fiancee who had become a hostage for my public activity. Now I am asking your support in the even more difficult and tragic struggle to permit my wife to travel abroad, a struggle that is vitally important on both the personal and public planes. I earnestly ask those who are concerned with my fate, who want to help me, to concentrate all their attention on this problem. I ask the heads of foreign delegations, I ask all participants in the Conference to support my appeal to Andropov through official, diplomatic channels as well as through private conversations which the Conference may make possible.

It is particularly important that Sakharov's scientific colleagues worldwide respond to his desperate plea for help. We urge them to write to the Soviet authorities, as well as to Soviet colleagues whom they know personally or by reputation, to appeal for intervention on behalf of the Sakharovs.

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Probing Titan's Surface

Recent reports (*1*) concerning the state of the surface of Titan indicate the need for new experiments and also provide an interesting example of the continual interplay between theoretical and experimental research. Theoretical considerations had led to suggestions that methane oceans cover Saturn's giant moon. In the Voyager project, detailed analysis of the radio measurements of the atmospheric temperature structure showed no effects of condensation, indicating that ubiquitous methane oceans could be ruled out. Theoretical arguments have now been presented favoring oceans, not of methane, but of ethane. Because of ethane's lower vapor pressure, such oceans would not have been detected by Voyager. Thus the stage is set for further experiments.

Radar would be an appropriate "next generation" remote probing tool. Radar signals would penetrate Titan's cloud cover, but would interact strongly with the surface, whether it were solid or liquid. Maps based on measurements of reflectivity, scattering from small-scale surface structure, topographic elevations, the unique signatures of ocean waves, and the electromagnetic polarizing properties of surface material could be obtained. In preliminary considerations of new missions, plans have centered on a spacecraft monostatic radar system (where the radio transmitter and receiver are both on the spacecraft), such as the one carried to Venus by the Pioneer orbiter. Study by Earth-based monostatic radars may also become feasible if system improvements are made. There are other possibilities, however, based on transmissions from Earth with reception on the spacecraft (or vice-versa) in the so-called bistatic radar mode.

Such bistatic methods (which include the radio occultation technique used for the Titan atmospheric study in the Voyager project) have been in use for two decades. They have led to a number of discoveries and have provided fundamental information about planetary atmospheres, surfaces, and rings. A feature of essentially all these experiments that may not be generally appreciated is how little transmitter power has been used, at most a few tens of watts from spacecraft telecommunications transmitters (their maximum capability) to ground-based receivers, over distances of up to 1.5 billion kilometers. In principle, the experiments could have been based on the much greater capabilities of the existing ground-based transmitters that are located at the NASA/Jet Propulsion Laboratory deep space tracking stations. They have been commanding spacecraft for many years at power levels of up to several hundreds of thousands of watts. Most of this power increase could be realized for experimental improvements if dedicated spacecraft receiving systems were provided. This increase in sensitivity is just what would be needed for studies of the surface of Titan in the bistatic radar mode, with measurement abilities competitive with what might alternatively be done with a spacecraft monostatic system. A bistatic receiver on a Saturn orbiter that repeatedly encounters Titan could be used also for greatly improved occultation studies of the atmospheres of Titan and Saturn, and even of the densest parts of Saturn's rings.

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