are, the growing federal support for the science stems from more practical motives. Paramount is the importance to the national interest of obtaining detailed maps of the submerged areas of the globe. The Polaris missile-firing atomic submarine could become our most important weapon system, and detailed maps would enable these submarines to calculate their positions within a few feet without ever venturing near the surface. The information would also be extremely useful for antisubmarine warfare. Beyond such direct military applications the time is seen ripe for making enormous strides in "farming" the sea, in controlling food fish, and, to a surprising extent, in controlling the weather.

It is pointed out, for example, that the difference in density between deep and surface water is a matter of the fifth decimal in relative density. This makes practical the "plowing" of the sea at a trivial expense of energy compared with that which is required to turn over the earth. It is suggested that releasing compressed air from tubes laid under certain areas of the sea could raise vast quantities of nutrient-laden deep water to the surface, with the result of producing a great increase in the yield of fisheries. The same technique has been suggested as a method for keeping certain ports, now ice-locked much of the year, open through the winter; compressed air would be used to raise currents of warm subsurface water to the surface.

Weather Control

It has been suggested that at certain critical points it may be possible to apply sufficient pressure to shift major ocean currents enough to alter quite substantially the prevailing climate in huge land areas. And it has been noticed that arid coastal areas receive increased rainfall when the sea is foamy. This is because droplets thrown into the air evaporate, leaving minute salt particles which are carried aloft where they serve as the nuclei of raindrops. It has been suggested that compressed air, again, might be used to achieve this effect artificially, producing substantial increases in rainfall along these now arid coasts.

Organizational Problems

It is the publicity that all these things have received from the NAS–NRC report and the other forces at work that have led to the increases in support for the science. But assuming, and opinions vary on this, of course, that oceanography has now achieved a proper degree of support in relation to other scientific programs, the question is raised whether this rather makeshift, basically political, method of rallying support for oceanography is really satisfactory and efficient. It is tempting, in situations like this, to seek some organizational cure-all, and advocates of a cabinet-level Department of Science sometimes point to an area like oceanography as an outstanding example of where such a department could function to establish priorities in various fields of science and to organize support in a more straightforward and less time-consuming method than had to be used in this case.

Indeed, several of the scientists who appeared before the Jackson committee this month, while opposing a Department of Science, suggested that in the case of areas like oceanography, which are so fragmented that there is no one who really feels responsible for the area as a whole, the National Science Foundation might be used to present a unified program to Congress and then distribute the appropriations to the operating agencies, as it now distributes research funds to nongovernmental agencies.

This would alleviate the sort of problem that was run into when the House subcommittee handling Commerce Department appropriations cut out the $300,000 of the over-all program assigned to the Weather Bureau. To this subcommittee the Weather Bureau is only a minor function of the Commerce Department, and when they began looking for things that could be cut it is not surprising that they questioned the necessity of the Commerce Department supplying the Weather Bureau with funds to do research in the ocean.

A considerable amount of effort, both in the executive and in Congress, has been going into such organizational improvements. In fact, there is a good deal of experience that suggests that more organization, by removing authority one degree further from operating responsibility, often succeeds only in further complicating the problems it was intended to cure. So the desire to seek organizational solutions is tempered by the recognition that there is a limit to the degree to which neat organization charts can really solve administrative problems.

Test Ban Talks: They Are Continuing Despite Summit Collapse

The technical side of the test ban negotiations continued through the collapse of the summit last week. Arrangements were being made to resume the political negotiations this week as the U.N. began the debate of the U-2 incident.

Officials here are pessimistic over the possibility of reaching agreement, for the principal unsettled issue is the question of inspection, and the events of last week will tend to make it more difficult to reach a compromise on this issue. On the one hand, the Russian contention that the West will use the proposed inspection as a cover for espionage has been strengthened; on the other hand, Khrushchev's exceedingly erratic behavior has led to new demands here that a really elaborate inspection system is needed to make sure that the Russians will not cheat.

British Prime Minister Harold Macmillan has told Parliament that he had gone to Paris with the hope that the remaining details for a test ban treaty could be pretty well worked out during the summit meetings. He said that even after the blow-up both Khrushchev and Eisenhower had assured him that their governments' policy of working toward a formal ban had not been changed, but that "I should not conceal from this House that this process may be somewhat less rapid than I had hoped." It was generally felt here and abroad that Macmillan's remark was a fine example of the British art of understatement.

There is a consensus of opinion that Macmillan is correct in his belief that basic policy on a test ban, as well as on other matters, has not been changed because of the blow-up. It was felt that this was indicated by Khrushchev's comparatively conciliatory speech in East Berlin, when he said that he had no intention of precipitating another Berlin crisis, that he hoped to settle the issue amicably at another summit conference "in 6 or 8 months." More specifically in regard to Geneva, it was noted that the Russian agreement to include nuclear as well as conventional explosions in the underground test research program, which the Russians regarded as a concession, came several days after the U-2 was downed. After our announcement of plans to resume nuclear testing as part of the detection program, a New York *Times* report

from Geneva suggested that our own representatives had interpreted this announcement as implying more than the Russian agreement in principle had actually conceded. Our representatives consequently expected a sharp Russian reaction. But the Russians did not make a fuss over the issue, and this mild reaction, when the Russians had an excellent opportunity to disrupt the meetings, came a week after the plane was down and several days after the story had broken into the open. From this and similar evidence, many observers incline to the belief that the Russians never intended any major alteration in their policies, but at Paris were reacting to what they felt was a sharp challenge to their national prestige contained in our public statements regarding the U-2. Indeed, James Reston reported that even as Khrushchev was going through the process of disrupting the conference his aides were assuring their Western opposite numbers that the Geneva conferences would continue.

American Reaction

On the American side we have already announced that the U-2 flights have been stopped and will not be resumed, and Eisenhower's somewhat enigmatic remark in Portugal that "perhaps here and there leaders make mistakes" was widely interpreted as an indication that despite the official American position, which puts all the blame on the Russians, the American leadership privately feels that we, too, were at fault.

Nevertheless, no matter how conciliatory the reaction of the Russians and ourselves, it is still felt that there is a serious question as to how much the Geneva negotiators will be able to accomplish until some months have passed and the tensions of the past weeks are relaxed. Even before the summit the President was under pressure to resume testing. Serious doubts had been raised regarding the degree of risk involved in the proposed treaty. These pressures and doubts will certainly be increased now. Joseph Alsop has reported that before leaving Paris Defense Secretary Thomas Gates and Chairman John McCone of the Atomic Energy Commission both urged the President to break off the Geneva talks. Edward Teller has made a strong statement asking for an immediate resumption of weapon testing in view of the collapse of the summit talks.

These men are far from alone in taking the position they do, and although the arguments they put forth have so far won only minority support in the political community, there are nevertheless serious arguments which cannot be lightly brushed aside. No one knows how much influence these views, strengthened by the summit breakup, will have. So far there has been no indication that will lead to an American withdrawal from the Geneva talks, but certainly no one expects a test ban treaty for a good many months.

There remains the *de facto* ban that has been in effect for 2 years. (Except for the two French tests, no one, so far as is known, has exploded a nuclear bomb since 1958.) But, it is pointed out, the real significance of the proposed treaty is not that it will stop ourselves and the Russians from further weapon development (We each already have the power to kill everyone on earth several times over.) but that it will be a step toward general disarmament and, more immediately, toward preventing the spread of atomic weapons to the at least half a dozen other powers, including Red China, which will be in a position to test nuclear weapons within a very few years.

Atoms for Peace Awards Presented

Four scientists who have made fundamental contributions to the development of nuclear reactors were presented with the $75,000 Atoms for Peace Awards for 1959 and 1960 on 18 May in a ceremony at the National Academy of Sciences. Leo Szilard, professor of biophysics at the University of Chicago, and Eugene P. Wigner, professor of theoretical physics at Princeton University, share the 1959 award, and Walter H. Zinn, vice president of the Combustion Engineering Corporation, and Alvin M. Weinberg, director of the Oak Ridge National Laboratory, share this year's award.

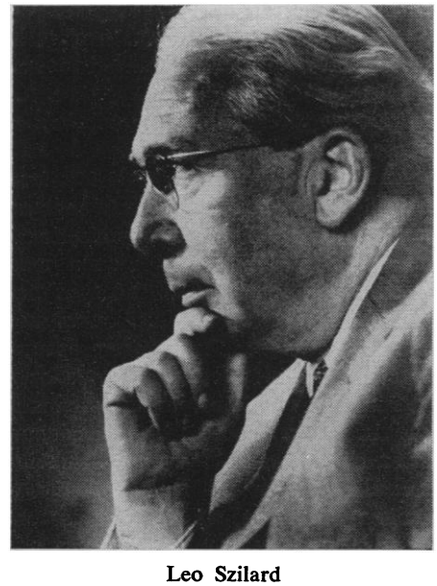
All four men are pioneer nuclear scientists who worked together at the Metallurgical Laboratory of the University of Chicago in 1942, when the first self-sustaining nuclear reaction was achieved at Stagg Field on 2 December. Szilard and Wigner composed the famous letter to Franklin D. Roosevelt from Albert Einstein that resulted in large-scale governmental support of nuclear investigations [see *Science* **131**, 1086 (15 Apr. 1960)].

The Atoms for Peace Award was established by the Ford Motor Company in 1955 as a memorial to Henry and Edsel Ford.

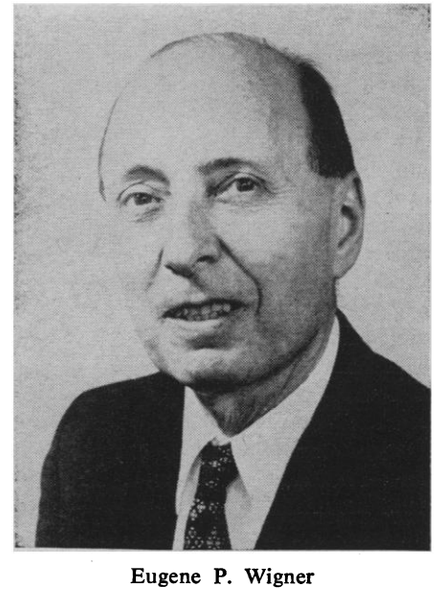
Winners Comment on Test Suspension

At a news conference after the presentation, the award winners were asked what they thought about current proposals for nuclear test suspension. Both Szilard and Wigner expressed a concern that the three-nation monitoring system under consideration at Geneva would only lead to friction and confusion.

Szilard doubted that the proposed system would stop nations that do not yet have atomic bombs from developing them. He commented: "Scientists cannot bring about disarmament, but they



Leo Szilard



Eugene P. Wigner