Americans and all humanity. This threat is very real and concrete in the present instance.

An additional factor which influenced his decision, Stamler said recently, was a belief that the particular projects in which he is engaged might have suffered had the committee been given an opportunity to put the spotlight on the federal and other public institutions that support his work.

Some might disagree with Stamler's conclusion that HUAC threatens science, either in general or in his particular case. Federal agencies have withstood similar sniping in the past, and the city of Chicago has indicated that it intends to continue its support. Nonetheless, although it is too early to judge how far it will spread, the Stamler case seems to be arousing substantial interest in the academic community. A Legal Aid Fund has been established to help pay the legal costs, which, it is expected, may rise to the neighborhood of $50,000. The chairman of the fund is Paul Dudley White of Boston, and the treasurer is Robert W. Wissler, professor and chairman of the Department of Pathology at the University of Chicago. Mailings sent out by two independent groups of physicians and scientists in the Midwest have already brought in over $10,000 in contributions. In addition, a committee of well-known scientists and other academicians is in the process of formation, not only to support Stamler but to lead in the exploration and exposition of the constitutional principles that his case against HUAC poses.

—ELINOR LANGER

Announcements

The **Middle Atlantic Planetarium Society** was formed recently at a meeting in Maryland. The group's aims included helping new planetariums and new planetarium teachers, primarily with curriculum materials; providing boards of education which are planning a planetarium with recommendations on construction; and acquainting its members with curriculum material at all grade levels. Additional information may be obtained from the chairman, Margaret K. Noble, of the D.C. Planetarium, Cardozo High School, Washington, D.C. 20009.

The American Institute of Biological Sciences has announced the establishment of the **BioInstrumentation Advisory Council** (BIAC). The council's purpose is to "facilitate directed information flow between biological and physical scientists," according to John R. Olive, AIBS executive director. It will evaluate instrumental and experimental techniques developed by engineers and physicists; perform surveys, and publish instrumentation information for biologists; and undertake projects designed to improve interdisciplinary research efforts in the two areas and to educate scientists in bioinstrumentation. An organizational meeting of ten selected members will be held 19 August during the AIBS meeting in Urbana, Illinois.

Lloyd E. Slater, formerly associate director of research at Case Institute of Technology is resident executive secretary of BIAC. He will continue at Case as a senior research associate in the Engineering Design Center. Headquarters for the council will be at AIBS, 3900 Wisconsin Ave., NW, Washington.

The **Universities Research Association**, Inc., was formed last month at a meeting of university presidents at the National Academy of Sciences. The corporation will offer its services to the federal government as manager of a proposed high-energy proton accelerator (*Science* 18 June, page 1573), if Congress approves its construction. The group will function as a "Council of Presidents," with each member institution represented by its chief executive. Its operations will be managed by a board of trustees composed of six members-at-large and 15 elected from nominees of the member institutions. Temporary trustees include the following university presidents: Detlev W. Bronk, Rockefeller; Robert F. Goheen, Princeton; Fred H. Harrington, Wisconsin; Grayson Kirk, Columbia; Joseph R. Smiley, Colorado; Elvis J. Stahr, Jr., Indiana; H. Guyford Stever, Carnegie; and John C. Warner, former president of Carnegie, who has headed the organizing committee.

REPORT FROM EUROPE

Decisions on Nuclear Power

London. Crucial decisions for the world's nuclear power industry have been occurring in Europe.

Britain has chosen its own advanced gas-cooled reactor (AGR) as the first of a group of power reactors which are scheduled to be completed between 1970 and 1975. When the choice was announced in May, it was said that gas-cooled reactors of the type selected would deliver electricity in Britain more cheaply than American-designed reactors offered by British builders, and more cheaply than the most modern coal-fired stations now on order.

Reinforcing the impact of the British decision was increasing confidence in France that French-developed reactors of the graphite-gas type, fueled with natural uranium, would, before the end of the decade, deliver electricity at a cost competitive with that for electricity from fossil fuels.

Another decision seems to ensure that cooperation on the development of atomic power among the six nations of the Common Market (West Germany, France, Italy, the Netherlands, Belgium, and Luxembourg) will endure. The members of the European Atomic Energy Community (Euratom) had been quarreling for more than a year about a revision of the agency's 1963–67 research program. Ministers of the six nations have finally agreed on a program which de-emphasizes work on reactor designs already developed and focuses Euratom's research on the future. Thus, spending for studies of the two reactor designs approaching competitiveness with conventional energy sources would be reduced, and spending on thermonuclear fusion, fast reactors, and a heavy-water-moderated, organic-cooled reactor called Orgel would be increased.

The author, Victor K. McElheny, is European correspondent for *Science*. He will report frequently on important scientific installations and developments. Mr. McElheny has been a science news reporter for the Charlotte *Observer*, a Nieman fellow at Harvard, and recently was associated with the Swedish-American News Bureau in Stockholm. His address is Flat 3, 18 Kensington Court Place, London W.8, England. Telephone: Western 5360.

(Euratom's decision is in line with the opinions of those American observers who are urging that the U.S. Atomic Energy Commission halt its support of development of light-water-moderated reactors.)

These developments can be considered part of a European response to events in the United States in 1964. Last year a New Jersey power company announced that it had ordered a 515-megawatt reactor which would surely deliver power more cheaply than a coal-fired station at the same Atlantic coast site—Oyster Creek, New Jersey. If its capacity could be expanded, as expected, to 620 megawatts, the Oyster Creek reactor would provide power more cheaply than the 1800-megawatt, coal-fired Keystone station being built near western Pennsylvania coal mines and linked to customers to the east by a 500,000-volt power line. For both the reactor and the Keystone coal station, the calculated prices for electricity were well below 4 mills per kilowatt hour, reflecting dramatic technical improvements and price-cutting over the preceding 2 years.

These events caused dismay in Europe among U.S. competitors; hence there was great interest in the comments of Philip Sporn on the Oyster Creek calculations. Sporn, a leading spokesman for the U.S. electrical industry, said the figures of the New Jersey Power and Light Company, and of General Electric, which would supply the reactor as a "turn-key" job, were too optimistic. He doubted that the capacity of the 515-megawatt reactor could be stretched by more than 10 percent, to 565 megawatts, without some redesign of equipment. If a stretch-out to 620 megawatts was possible, too little time was being allowed for it. The load factor chosen for Oyster Creek, 88 percent, was higher than the usual 80 percent. Sporn speculated that General Electric might have quoted artificially low prices on this first reactor in hopes of recouping later by selling a series of reactors.

Despite the encouragement such comments offered Europeans, neither the French nor the British could present definite figures for comparison at the third Geneva conference on the peaceful uses of atomic energy, in September 1964. At Geneva, observers like Alvin Weinberg of Oak Ridge National Laboratory expressed doubt that many European firms could compete with the Americans on reactors using fuels highly enriched in uranium-235, because of the plentiful supplies from the large gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.

For most of 1964, discouraged observers in Britain expected that the country's huge supplier of electricity, the Central Electricity Generating Board (CEGB), would be forced to choose American designs for the second British nuclear power program (1970–75). The capital cost for the American reactors was said to be around $110 per installed kilowatt, against prices of $180 or more expected for British designs. These figures were crucial, for the CEGB had just won a major battle for the right to select stations on economic grounds.

The pessimists failed to realize, however, that there were many factors which might increase the relative cost of applying an American concept in Britain. The CEGB might be conservative in its specifications for British reactors. British firms bidding with American designs might be more conservative on profits than those bidding with British designs. In Britain, nuclear stations are still generally assigned a lifetime of 20 years, not 25 or 30, as in the United States. Moreover, the load factors assigned to them are 75 percent, not 80 percent or higher.

In early 1965 there was a surprise. Word leaked out that the CEGB had been willing to look at a proposal which departed from its specifications. The new proposal made changes in the design of the advanced gas-cooled reactor which is now the main project of the United Kingdom Atomic Energy Authority.

The improved economics of the reactor allowed an important advantage of the concept to come into play: the high temperature of its cooling gas. It is high enough to permit use of the high-efficiency turbogenerators developed for coal and oil stations.

When all the bids, re-bids, and studies were complete, it appeared that use of the American designs in Britain would cost about $168 in capital per kilowatt, a good deal higher than Philip Sporn's estimate of $139 per kilowatt for a "post-Oyster Creek" reactor with capacity of 550 megawatts which could be stretched 10 percent to 605 megawatts. With the revised gas-cooled reactor, Atomic Power Constructors, one of the three consortia of firms which have handled the nine commercial power reactors built or building in the United Kingdom, was able to bid around $185. But lower operating costs gave the reactor something like a 10 percent advantage over the American water-moderated reactors. For one thing, the British reactor uses fuel containing 1.6 percent of uranium-235, while the American reactors use fuel containing more than 2 percent. Both the American and British reactor concepts were economically competitive with the 2000-megawatt, coal-fired stations now being built near British coal fields.

The decision to build the British AGR reactors had a number of important implications.

1) Production targets of 200 million tons per year for the United Kingdom coal industry might be increasingly hard to maintain if the CEGB's consumption of coal begins to level off soon after 1970. Some observers commented that coal-fired stations in the south of England are no longer competitive.

2) Since the 1200-megawatt AGR station to be built at Dungeness would cost $224 million, it appeared that the 5000 megawatts planned in the second nuclear power program could be achieved for about $900 million instead of the $1120 million forecast. This and the technical possibility of constructing even larger AGR stations would add pressure for an expanded program. The first program of nine stations, totaling 4800 megawatts, ends in 1969.

3) The Atomic Energy Authority has been studying a 1000-megawatt AGR reactor to be used both for power and for the desalting of 30 million gallons of sea water a day. This is just one sign that the AEA hopes for sales of the AGR overseas. The impact of the British decision on world sales of reactors might be important. This fact added urgency to the protests in America and Britain which followed the announcement.

4) Now that a series of large AGR's is likely to be built, the AEA's plan for remodeling the Capenhurst gaseous-diffusion plant is likely to move off the shelf. The British are confident that remodeling will make Capenhurst, which is now almost completely shut down, as efficient as American plants.

Up to now, Capenhurst has only supplied uranium-235 for military weapons and reactor experiments. The nine commercial "magnox" reactors, developed from the plutonium-production reactors of Calder Hall, all use natural uranium.

5) There seems to be considerable prospect of AGR's operating at even higher temperatures. Its uranium dioxide fuel elements may be useful up to 1600°C, in contrast to the 750° top operating temperature of the European Nuclear Energy Agency's Dragon reactor project in Dorset.

The French Program

Although the French program of building nuclear power stations is less ambitious than the British, present plans call for up to 6000 megawatts of installed nuclear power plant by 1975 (as compared with 10,000 in Britain). Last 16 December, the French council of ministers approved the start of construction on plants of at least 2500-megawatt capacity, and an optional 1500 megawatts more, to be completed during the period 1966-70. Meanwhile, reactors now being built, together with those already in existence, will give France in excess of 1400 megawatts of nuclear plant capacity.

The power reactors built or building in France include the three plutonium-production reactors at Marcoule, a heavy-water-moderated reactor in Brittany, three reactors at Chinon in the Loire valley, and one at St. Laurent-des-Eaux on the Loire.

As first installments on the 2500-megawatt program, the French power authority, Electricité de France, has decided on a second reactor at St. Laurent-des-Eaux and one at Bugey, near Geneva. Each will have a capacity of 500 megawatts.

The Euratom Program

In developing new types of reactors, both Britain and France lean, in part, on international programs. The high-temperature gas-cooled Dragon reactor at Winfrith, Dorset, is one example, and the plutonium-fueled Rhapsodie fast reactor at Cadarache in Provence is another. Both Britain and France manage their heavy-water developments themselves, and Britain's own fast breeder reactor at Dounreay in Scotland has operated since 1959, achieving notably high burnup of its fuel elements.

Nonetheless, the role of the European Atomic Energy Community (Euratom) in the future of Europe's nuclear power industry has been important enough to excite major quarrels among its members. It is through participation in Euratom that several European nations have gained experience in building power reactors according to American designs. Despite too great a geographical diffusion of its program, Euratom wrought an improvement by taking over one of the excessive number of national atomic energy research centers—Ispra in Italy. Through its research budget—$190 million for 1958-62 and $449 million for 1963-67—Euratom sponsors much research on fast reactors and thermonuclear fusion, to say nothing of its programs in biology and other fields.

Rather early in the second 5-year budget period, the permanent secretariat of Euratom in Brussels decided that price increases and new research opportunities would require increases in the budget. The increases were requested—and then a storm broke over the secretariat's head. The French Government accused Euratom of diffusing its effort over too many fields and again expressed its annoyance at Euratom's role in encouraging the import of American reactors (three, so far) into Community countries. Other countries agreed, in principle, that Euratom's budget should not be expanded (*Science*, 15 January).

The issue was not so simple. If the budget was not to grow, certain items would have to be cut. If, at the same time, French suggestions for greater emphasis on certain items were followed, the cuts would have to be correspondingly deeper. The Italians fought any cuts in work at Ispra or in Euratom contracts in Italy. The French bitterly opposed a contract for fast-reactor work in Italy in addition to work in France and Germany. France and the Netherlands quarreled to the last about development of Euratom's part of the Dutch nuclear center at Petten, which Holland surrendered some time ago.

The quarrels continued through meeting after meeting of ministers from member nations until finally, on 13 May, the ministers agreed to boost the total budget to $455 million. A reserve of $3.1 million was set up. Budgets rose for work on plasma physics (by $3.5 million), fast reactors ($9.5 million), and the Orgel heavy-water-moderated, organic-cooled reactor ($7 million direct and an extra $8 million to the Ispra center). Allocations fell for proved types of reactors (by $6 million), reprocessing of fuel elements ($8 million), and the Petten center ($2 million).

Now that the 5-year budget has been redivided, Euratom must deal with proposed changes in its 1965 budget and must complete preparations for the "fusion" of the executives of Euratom, the Common Market, and the European Coal and Steel Community that is scheduled for the end of the year. Many observers hope that "fusion" will provide an opportunity to tighten up the diffuse organization of Euratom.

In view of the need for European nations and businesses to combine in the face of American economic competition—a need incessantly discussed in Europe these days—the question of Euratom's future is more than academic. Britain and France have followed parallel courses in developing power reactors, and it is likely that the two countries will have to combine in order to sell significant numbers of their similar reactors, not compete, as they are doing in Spain. Other nations in Europe need Euratom if they are to participate in the development of nuclear energy without collaborating with the United States.

Billions of dollars are at stake: Euratom's own staff forecast in March that the nuclear power generated within the six Common Market nations would increase by a factor of 100 between 1970 and 2000. Between 1980 and 2000, it was predicted, two-thirds of the new electrical generating capacity installed in the six nations would be provided by reactors.

—VICTOR K. MCELHENY