fore the meeting. A limited number of travel grants of $150 to $250 will be offered for persons working in European laboratories; applicants should indicate their age, academic affiliation, publications, and whether or not they intend to present a paper. Meeting language: English; deadline for notification of intent to attend or to present a paper, and for applications for travel grants: *15 July*. (Organizing Committee, 1966 European Phage Meeting, International Laboratory of Genetics and Biophysics, Naples)

Summer Institutes

The following are NATO Advanced Study Institutes:

Aurora and Airglow, 15–26 August, University of Keele, Keele, England; to cover theoretical and experimental-research findings; fellowships available. (B. M. McCormac, Geophysics Division, IIT Research Institute, 10 W. 35 St., Chicago, Ill. 60616)

Optical Properties of Solids, 7–20 August, Freiburg, West Germany; for advanced students in solid-state physics and for physicists with research training in the field. (S. Nudelman, University of Rhode Island, Kingston)

Symmetry Principles in Elementary Particle Physics, 8–27 August, Istanbul, Turkey; for advanced graduate and postdoctoral students; some fellowships available; deadline: *15 May*. (Arnold Perlmutter, Center for Theoretical Studies, University of Miami, Coral Gables, Florida

Scientists in the News

J. Anthony Deutsch, professor at New York University, and **David M. Green**, an associate professor at the University of Pennsylvania, will become professors of psychology at the University of California, San Diego, 1 July. The university's new graduate program in psychology is to start in September.

The new director of the Stevens Institute of Technology computer center is **Irving Rabinowitz**, formerly associate director of the computer center at Princeton.

L. R. Quarles, dean of engineering at the University of Virginia, has been appointed chairman of the recently formed engineering education committee for Oak Ridge Associated Universities.

The Mees medal of the Optical Society of America was presented recently to **Bengt Edlén**, professor of physics at the University of Lund, Lund, Sweden. The award cites his work over a 35-year period on the light emitted by the vapors of highly ionized elements.

Howard V. Rickenberg, professor of bacteriology at Indiana University, will become professor of microbiology at the University of Colorado medical school, effective 1 July. He will also become research director of the National Jewish Hospital in Denver.

The university has appointed **Strother H. Walker** associate professor of preventive medicine and comprehensive health care, beginning 1 September. He is now principal investigator in charge of the statistical group at Johns Hopkins University's Operations Research Office.

The 1965 Helen B. Warner Prize of the American Astronomical Society was presented to **Riccardo Giacconi**, director of the space research and systems division, American Science and Engineering, Inc. He was cited for his discovery of "x-ray stars" and for his part in the invention of an x-ray telescope.

REPORTS FROM EUROPE

Bolder Policies for British Technology?

London. Scientific and technological issues underlying Britain's continuing economic difficulties, such as those which touch the bellwether airplane and computer industries, received virtually no attention during the parliamentary election campaign that has resulted in a solid majority for Harold Wilson's Labour government.

Even more than in the previous campaign of October 1964, discussion was dominated by economics and social policy. But the real issue was whether the voters felt that Wilson had earned a chance to govern strongly. They did.

Yet it would be wrong to assume from this campaign silence that the Wilson government had not faced many scientific and technological issues or that these issues will not become more insistent now that the government has won the power to act independently.

Besides canceling a number of unpromising development projects, the Wilson government undertook a major redistribution of scientific agencies. But this was not all that the firmly nonideological Wilson cabinet did. It took important steps to meet long-term and short-term difficulties of science and technology, even though the cabinet was forced to focus its attention on such problems as saving money on defense, maintaining the relative value of the pound sterling, and preventing an African explosion over the seizure of power by the white minority in Rhodesia.

Moving into fields where a payoff is not likely for some years, the newly formed Ministry of Technology began encouraging mergers in the fragmented machine-tool industry, approved a large-scale test of an advanced American system for programming machine tools (using a rented American computer), and advanced $14 million to the recently amalgamated British computer firm, Imperial Computers and Tabulators, to help it develop programs and ancillary equipment for a new computer series. The ministry went ahead with plans for a National Computer Center to be built at Manchester. The center will contain a library of programs, will develop new programs, and will help individual firms adapt their activities to computer technology.

Since it was recognized that the organization of industry has a direct impact on innovation, committees were formed to investigate the airplane-building and shipbuilding industries, and these committees, headed respectively by Lord

Plowden and Reay Geddes, have completed their reports. Both groups advised concentration of activities and considerable state aid.

Although Defence Minister Denis Healey was forced to cancel construction of a British-designed supersonic bomber (the TSR-2), to reject construction of a new aircraft carrier, and to authorize purchase of a large amount of military equipment from the United States, he still showed a readiness to encourage locally inspired technological innovation. It was announced that the Navy would construct an advanced type of guided-missile destroyer, and that the conventional engines of a 1500-ton frigate would be replaced by gas turbines of the sort that will be used on the Concord supersonic transport, which Britain is building jointly with France.

This year, the first Hovercraft will cross the English Channel on commercial service. The craft was designed by a British engineer, Christopher Cockerell, and developed with the support of the government-backed National Research Development Corporation. The industry for building Hovercraft has just been reorganized and given new backing, although Cockerell is dissatisfied with the size of the $14-million stake and with the government's decision to concentrate most of the work in a single firm instead of bringing in additional firms.

In the field of energy, there has been much movement in Britain since the Wilson government took office. Although the government can take little direct credit for what has happened, the encouraging developments in Britain's energy supply are an important indication that bold technological policies in Britain would not operate in a vacuum.

One important development has been the discovery of natural gas in the British sector of the North Sea and the government's decision to pay a high enough price for it (58.5 cents per million British thermal units) to encourage further intense exploration of an area which may have much gas but little associated petroleum. In many places gas is found along with petroleum, thus petroleum companies can sell the gas at lower rates than if only gas were found.

The government has approved construction of a group of large gas-cooled reactor power stations of advanced design and has also committed $84 million to building a prototype reactor, of the breeder type, which is scheduled to produce 250 megawatts of electricity in the early 1970's. The go-ahead on the power stations was made possible by a last-minute improvement in the design, which made it more economically advantageous, under British conditions, than either of two American designs also considered. The improved cost picture allowed the government to increase the power-reactor target for 1970–75 from 5000 to 8000 megawatts.

After some initial hesitation over the Concord project (which is now likely to cost over $1 billion), the Labour government not only decided to stay with it but started working with France on two other projects: a civilian "air bus" and a supersonic military bomber.

Although the continuing economic emergency forces a British government to stress technology, the Wilson cabinet has not been unfriendly to basic science. The amount of money available to the Research Councils (agencies for granting money to scientists) rose about 20 percent in the budget year which ended 31 March and will rise another 20 percent this year, according to a pledge made just before the election by Reginald Prentice, minister of state in the department of Education and Science (*New Scientist*, 24 March).

During 1965 the British Government approved the commitment of funds to construct storage rings for the European proton accelerator at Geneva. The government has not only approved greatly increased funds for the National Institute of Oceanography but has also decided on large general increases for both biological and physical oceanography, including a modest program of undersea exploration. There has been much agitation in Britain for research with experimental vessels like Jacques Cousteau's "diving saucer" or the small Alvin submarine, which was used in locating the hydrogen bomb lost in the Mediterranean.

All this might seem a reasonably positive record for a government with many more immediate preoccupations. But comment about British policy for science and technology has been generally critical since the Wilson government took office. This can be explained partly by the high hopes Wilson himself raised by making science and technology a major theme of his 1964 campaign. In his famous Scarborough speech in 1963, Wilson had promised that a new Britain would be forged in the "white heat" of scientific revolution. This appeared to mean that a Labour government would not only foster science and technology but would bring in many scientists and engineers from outside the government to add new life to the thinking in the offices along Whitehall.

But the new Labour government was at once overwhelmed with a massive threat to the value of the pound. A great deal of money had to be borrowed, and, to satisfy the bankers who lent the money, the government had to abandon policies aimed at brisk economic expansion. One of many restrictions which had to be imposed was a freeze on university construction.

The fear began to develop that short-term crises were pushing the elements of a fundamental solution out of the way. This feeling, among serious observers, was hardly diminished by the obvious relish with which Wilson pulled the levers of power. Was Wilson too ready to turn away from the fundamental questions of modernizing industry and of maintaining the kind of science and technology effort which would keep industries vital in decades to come? With the security of a majority of 97 seats in the House of Commons, would Labor be radical enough? Would it be ready to intervene to streamline industries or to force more modern attitudes on unions still haunted by the memory of 20 years of high unemployment before 1940?

Observers who raised these questions were not limited to members of the Conservative and Liberal parties, who had discussed the question of industrial efficiency very generally in the campaign. Some of the critics were in the Labour party, and they had detailed complaints to make.

Such observers were unmoved by Wilson's throwaway comment during a television appearance on the night the campaign opened that mobilizing the scientific revolution wasn't done in a day. In fact, it was felt that the positive actions of the Labour government were concentrating too much on the long term.

Instead, it was asserted, the Labour government should treat the current

economic crisis as a technological emergency requiring the decisiveness and mobilization of wartime. This would entail the kind of redirection of scientific talent which led to development of a workable radar system in time for the Battle of Britain in 1940, or the kind of executive ruthlessness which enabled Lord Beaverbrook to produce the fighter planes for that battle. Hence, there should be a shift of balance in Britain's scientific community away from fundamental research toward direct industrial applications. This would mean a massive application to industry of the methods of agricultural extension—generally felt to be a big success in Britain.

In this view, the emphasis must be on immediate use of existing knowledge. A key to this would be a new and probably un-British emphasis on sales, especially on detailed market surveys and liaison between producer and customer such as are found in the American airplane and computer industries. The critics maintain that the new Ministry of Technology and the older commerce ministry, known as the Board of Trade, are avoiding these immediate questions.

Such considerations are part of a serious continuing debate about the best way to use government power to stimulate technological innovation. Although many participants in the debate are academics, many of these academics are advisors to the government. Hence, their disenchantment with the progress made so far cannot be dismissed as typical British carping.

The critics, like their American counterparts, acknowledge that there are few quick ways of converting a government's experience in stimulating innovation in defense industries to such civilian uses as reinforcing technologically advanced industry, strengthening technologically weak industry, and improving the status and education of engineers. But they feel that too much attention is being given to such long-term factors, and not enough to the question of what Britain could do through better use of her present scientific and industrial resources.

In this view, the Ministry of Technology should set up an operations research center which would concentrate on achieving the best organization of labor and machinery in existing factories and identifying plants that should either be closed or completely re-equipped.

Because selling is a vital part of innovation in industry, critics feel, the Ministry of Technology should play a big role in stimulating a more professional approach to sales. The ministry should examine the sales effort in the machine-tool and computer industries, for which it has been given special responsibility. When the sales effort is inadequate, the ministry should itself undertake needed market surveys and analyze the successes of foreign competitors.

Critics who take this point of view stress that the Ministry of Technology has not grasped the fact that salesmanship is not merely some vague factor in Britain's overall economic difficulties but a vital tool of technical advance.

While the Ministry of Technology is looking critically at industrial organization and sales, the critics assert, it should also take a hard look at the operations of the many laboratories it supervises, such as the National Physical Laboratory near London, the National Engineering Laboratory in Scotland, and the Atomic Energy Research Establishment at Harwell, near Oxford. The ministry has promised to do all it can to get these laboratories interested in problems of importance to industry, and to encourage the scientists there to help out with industrial problems. But the critics feel that these efforts have not been carried out with much urgency. The laboratories largely have a life of their own, and the ministry is too new and too diffusely led to exert much direction.

To turn the Ministry of Technology in these directions, it is said, it might be advisable to violate old Whitehall traditions and hire the head of its administration, the permanent secretary, from outside the government on a fixed-term contract. Such an action would be in line with the Labour government's promises to bring vigorous outsiders into Whitehall. There are earlier precedents. In World War I, David Lloyd George chose a group of businessmen to run a flock of emergency ministries. A few years ago Harold Macmillan brought in a group of outsiders to run the nationalized industries on more business-like lines.

Implicit in this emphasis on immediate technological mobilization to meet an immediate economic crisis is rejection of the idea that Britain should strive for leadership in all branches of science and technology. The critics believe that Britain has surrendered leadership in more fields than is good for its economic health, but at the same time they assert that Britain probably would do well to import even more technology, through payment of license fees to overseas holders, than it does now. In this view, the import of ideas is usually very cheap as compared to the import of goods—that is, if industrial management is ready to change its methods and strive vigorously for increased production and new business.

Some critics of the Ministry of Technology feel that it clings too much to the idea of being fair to all industry, instead of ruthlessly encouraging the best, the most modern. In this view, the Labor government, far from being too "socialist," is not interventionist enough. Observers who hold these opinions (who are not, of course, necessarily socialists themselves) thus welcome the Labour government's recent decision to set up an Industrial Reconstruction Corporation, with a capital of $420 million. The IRC will be modeled on the Italian Istituto per la Ricostruzione Industriale, which has played a major role in Italy's very great economic expansion since World War II. The British IRC will be able to arrange mergers and reorganizations, especially those which will help increase exports.

But there are other things that the Ministry of Technology could do directly. One of the most brutal suggestions is that the ministry should keep a running published register of technologically up-to-date firms which deserve special tax assistance.

Critics who take this view point out that many remedies which have been discussed in Britain are either ineffective or too slow to meet the immediate crisis.

One such remedy is greater use of the government's power of purchase. The American Department of Defense is known to have pressured contractors into using computers to speed design work leading up to bids on defense system contracts. In World War II, the British Navy decided to order turbines from firms which had not previously sold them to the Navy, in the hope of getting more rapid innovation from newcomers to the business.

From America, too, there is the famous example of Henry Kaiser, who brought assembly line methods to shipbuilding. These are compelling examples of the power of the purchaser to stimulate innovation. But how is the British Government to influence the textile and clothing industries or the printing industry, from which it buys little? The effects of mergers and reorganization of the administration of firms are also likely to be slow.

But isn't foreign competition an important spur to innovation? Won't Britain's entry into the European Economic Community, which can be expected fairly soon now that it will help DeGaulle in his aim to keep the Community from developing into a tight political union, stimulate British industry? The critics answer that such competition has always been important for British firms. And yet, Britain's share of total international trade has been falling, just as the United States' share has been. It is clear to economists that an important reason for this lag in export growth has been the relatively high price charged for British manufactures. Furthermore, many British firms are content to export rugged machinery of conventional design to underdeveloped countries rather than convert to the manufacture of more advanced products.

In short, to some critics of the Ministry of Technology, Britain's technological crisis is serious enough to warrant moving beyond the modest, long-term moves now being made by many governments. They want more direct, brutal intervention. They are not sure they will get it from the newly strengthened government of Harold Wilson.—VICTOR K. MCELHENY

Kapitsa To Visit England

London. In May, Pytor Kapitsa, the Soviet physicist, is scheduled to visit Britain for the first time since 1934, when he was detained in the Soviet Union during his annual visit to his mother. From 1921 to 1934 he had worked at the Cavendish Laboratory, Cambridge.

Kapitsa has accepted an invitation to come to Britain to receive the Rutherford medal and prize, recently awarded him by the Institute of Physics. He will lecture to the Institute of Physics and the Physical Society, and also to the Royal Society. Kapitsa's Royal talk will be about Lord Rutherford, who was head of the Cavendish during the 13 years Kapitsa worked there.

During his stay at the Cavendish Kapitsa did much work on intense magnetic fields, moving on to elaborate experiments at very low temperatures. A laboratory for Kapitsa's work was opened in 1933 by Prime Minister Stanley Baldwin. By 1934, Sir John Cockcroft has noted, the laboratory was equipped to carry out experiments down to liquid helium temperatures.

Before Kapitsa had published his paper on an expansion-engine helium liquefier which he had designed, he was held in the Soviet Union by Stalin's order. As Cockcroft noted [*New Scientist*, 10 December 1964]:

> There were strong protests, particularly by Rutherford. "Science," he said in a letter to the *Times*, "is international and long may it remain so." However, this was of no avail. In April 1935, the news of Kapitsa's detention was announced in the press and the [Soviet] Academy of Sciences announced that [Kapitsa] had been appointed director of the Institute of Physical Sciences in Moscow and that 3.5 million rubles had been set aside for its building and equipment.
>
> Rutherford then negotiated the sale of the whole scientific equipment of the Mond Royal Society Laboratory [Kapitsa's installation at the Cavendish] to the Academy for £30,000 [over $120,000]. . . .

These events and Kapitsa's eminence and identification with Britain during an exciting period in the history of physics rouses special interest here in Kapitsa's scheduled visit.

The interest is increased by two recent strong public stands Kapitsa has taken in the Soviet Union. He and many other scientific and literary figures recently signed a letter urging the 23rd Congress of the Soviet Communist Party not to "rehabilitate" Stalin. Then, in January, Kapitsa surprised many by writing an article in *Komosomolskaya Pravda,* the Communist youth newspaper, in which he asserted that the scientific effort of the Soviet Union lagged behind that of the United States. He urged that laboratory directors be given authority to send 15 to 20 percent of the duller, older researchers off to industry, to make room for vigorous younger scientists (see *Science*, 28 January).

Kapitsa's statement was not the first public discussion of the problem of promoting younger scientists, nor was it his first entry into public controversy since Stalin's death. In early 1962, a campaign to promote men in the 35-40 age range to scientific leadership was announced in the official publication of the Academy of Sciences by Academician V. A. Topchiev. This was followed by a decree.

Three years earlier, in November 1959, Kapitsa had joined two other physicists, Igor Y. Tamm and Lev Artsimovich, in writing a bitter attack, published in *Pravda,* on journalistic coverage of science in the Soviet Union. They declared that a theory, proposed by the astronomer Nikolai A. Kozyrev, that the flow of time produces energy in the universe was vague, unscientific, and unconvincing and that the intense press coverage it received was the sort of "cheap sensation" that was clouding genuine Soviet achievements in science.

Writing in the Communist Party's *Ekonomicheskaya Gazeta* in 1962, Kapitsa condemned the tendency to judge the truth of scientific discovery by misapplying Marxist dialectics. He said that Linus Pauling's theories of chemical bonding, Werner Heisenberg's formulation of the uncertainty principle, and cybernetics were all at one time denounced because of a supposed conflict with Marxism. He also alluded to similar mistakes in the field of biology.

It appears that Kapitsa did not take part in the development of atomic weapons in the Soviet Union. Cockcroft said recently: "I don't think he had anything to do with it. During the war he worked on the liquefaction of oxygen for the steel industry and since then his main interest has been microwave electronics."—V.K.MCE.