versity, Manhattan, Kansas. He succeeds **Harold Howe**, who resigned to become dean of the graduate school at St. Louis University.

Robert B. Young has returned to Aerojet General Corporation after a year's leave of absence, during which he served as director of industrial operations at NASA's George C. Marshall Space Flight Center, Huntsville, Alabama. He is vice president and general manager of Aerojet General's Sacramento plant.

Recent Deaths

Walter H. Bucher, 76; professor emeritus of geology at Columbia University; 17 February.

David Powell Hackett, 39; professor of biochemistry at the University of California, Berkeley; 21 January.

Virgil M. Hancher, 68; retired president of the University of Iowa; 30 January.

Svend Oluf Heiberg, 64; associate dean of the State University College of Forestry, Syracuse University; 5 February.

Victor Hess, 81; professor emeritus of physics, Fordham University; 17 December.

Helen Lasby Jeffrey, 54; biochemist at the National Institutes of Health; 10 January.

Jaroslav Kříženecký, director of the Mendel Memorial Museum, Czechoslovakia; 21 December.

Herbert Leaderman, 51; retired physicist at the National Bureau of Standards; 20 February.

Hanns G. Maister, 69; chemical engineer, U.S. Northern Regional Research Laboratory, Peoria, Ill.; 15 February.

Ferdinando A. Morin, professor of anatomy and chairman of the department, Wayne State University; 26 November.

Elizabeth Trevett Peabody, 59; retired regional medical director at the Children's Bureau, Atlanta, Ga.; 18 February.

Ernest R. Purvis, 58; professor of soils, Rutgers University; 30 December.

James A. G. Rehn, 83; chairman of the entomology department, Academy of Natural Sciences of Philadelphia; 25 January.

I. Melville Stein, 70; former president, Leeds and Northrop Company; 24 January.

Oskar von Engeln, 84; professor emeritus of geology at Cornell University; 25 January.

Erratum: In the review of the book *Nuclear Power, U.S.A.* (12 Feb., p. 721), the third author's name was incorrectly given as John F. Haggerty. The author is John F. Hogerton.

REPORT FROM EUROPE

West German Research Spending: Plans for 1966 to 1968

London. West German Chancellor Ludwig Erhard and Science Minister Hans Lenz apparently meant business late in 1964 when they asserted that central-government support for higher education and research must double by 1970. Recently, the ministry of science issued a report which detailed plans to increase this support in the next 3 years by an average of 75 percent over the level planned for 1965.

Thus, in the Federal Republic of Germany, spending for science, engineering, and higher education would rise from about $556 million this year to an average of about $892 million yearly in 1966–68. One of the report's many tables indicates, furthermore, that the ministry of finance has planned for most of the increases to take place in 1966 alone.

General support for research and education would more than double, increasing from $124 million to $285 million a year. The general support funds pay the central government's contributions to university building costs, the grant-making German Research Association (DFG), and the more than 40 research institutes of the Max Planck Society.

The outlay for Germany's modest space program would also more than double, from $35 million to $98 million a year. Much of the increase would go to build up the domestic space effort, which in 1964 and 1965 is receiving sums smaller than Germany's contribution to the European research and rocket-development programs.

Although expanding less notably, defense and atomic-energy research and development would each take close to a fifth of the total: about $210 million yearly for defense and $170 million for atomic energy. Only about 10 percent of the defense research and development spending is classed as research; these funds support nonclassified studies in universities, research at the joint German–French defense institute at St. Louis in France, and collaboration with industry and research in several institutes of the Fraunhofer Society. Of the atomc-energy budget, close to a third has been earmarked in recent years for such international undertakings as the high-energy research center at Geneva (CERN), the chemical-processing company (Eurochemic) at Mol, Belgium, and the European Atomic Energy Community (Euratom), which, of course, finances a considerable number of projects in Germany. Other major German nuclear-energy projects are the electron synchrotron in Hamburg, the fusion research center outside Munich, the construction of the atomic-powered merchant ship *Otto Hahn*, and the Karlsruhe reactor development center.

Also included in the budget for higher-education and research are support for university students and for research in the laboratories of government ministries. Both these forms of support will expand.

The science ministry's report is the

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first of a series that the ministry plans to issue each year. It does not spell out the amounts to be spent in each of the years 1966, 1967, and 1968, but leaves such details for later negotiation among ministries and between the cabinet and the West German parliament, giving, instead, a forecast of the total spending for 3 years, totals which will have to be approximately achieved if the government is to achieve its goal of doubling its research expenditure by 1970.

The report contains more than forecasts, however. It brings together many figures on past spending in Germany and makes detailed comparisons with the spending patterns in other countries, including the United States and the Soviet Union. Hence, for observers in and out of Germany, the report gives a convenient perspective on the rapid expansion of scientific budgets in Germany since Sputnik.

Central Government as Patron

As the report notes, the most striking feature of the years since 1957 in Germany has been the rapid emergence of the central government as a patron of research and higher education. These same years have seen a swift expansion of research programs outside the university structure, even today largely supported by the ten states of the German Federal Republic.

Since 1956, the total of private and public spending for research and higher education has risen four times over. Overall public spending has risen somewhat faster than private, but outlays by the states have only tripled, whereas those of the central government have increased more than 10 times.

In 1956, the total spent for these objects was $500 million, and in 1964 it was $2000 million. These expenditures consumed 1.0 percent of the gross national product in 1956 and 1.9 percent in 1964. In 1956, the central government contributed only 15 percent of the total contributed by public sources, but by 1962 the central government's share of this total had reached its present level of about 40 percent. Except for small contributions from municipalities, the states provide the other 60 percent of the public share.

Thus, despite rapid increases in its support of science, the central government of West Germany plays nowhere near the dominating role played by the federal government of the United States, which is estimated to contribute about three quarters of all funds for research and development. Of the total private and public support in West Germany for research and higher education, the central government contributes about 26 percent, the states 38 percent, and private foundations and firms 36 percent. (Practically all the private expenditure goes for work in company laboratories and plants.)

A fully accurate comparison with the United States figures would be difficult to achieve, however, not only because the German word for "science" includes all branches of academic learning, but because all activities of universities—subventions to students, teaching, research, and medical clinics—are viewed together.

Adjusting German figures to make them comparable to those for American spending for research and development would involve reductions of at least 20 percent. One section of the report is addressed to this problem.

In Germany, as in Sweden and other countries which pay the full cost of their university systems out of state budgets, it is estimated that no more than half of the money appropriated to universities should be counted as support for research. This estimate is based on the somewhat shaky assumption that university instructors spend about half their time on research. (The report does not attempt to unravel university salary budgets by subtracting the salaries of instructors in fields outside the natural sciences and engineering.)

At university clinics, the Germans feel, only about one-third of the budget should be counted as research support. Scholarships should not be counted as research support at all.

When these corrections are applied to private and public spending for research and higher education in West Germany in 1962, the total shrinks from $1470 million to $1179 million. The reduction sharply changes the relative contributions of economic sectors: of German funds used for research and development, private sources provide 47 percent, the central government 27 percent, and the states 24 percent.

Despite the corrections, the states' contribution to research remains significant. Besides paying the salaries of university instructors and maintaining buildings and basic equipment, the states also pay half the cost of the German Research Association and the Max Planck Society (*Science*, 5 February) and have paid about a third of the costs of the West German nuclear energy program. Through 1962, the central government paid about $375 million, the states $165 million. More than half this contribution came from the state of North Rhine–Westphalia, which pays the operating costs of the research center at Jülich, including the salaries of its 2600 employees.

Although impressive, these efforts by West German state and central governments should be viewed in the perspective of efforts in another continental country, France. The overall figure for Germany for 1962, $1179 million, compares favorably with the $1050 million estimated for France by its General Delegation for Scientific Research. However, both these totals include large amounts, difficult to evaluate, for spending in industrial laboratories. The French atomic energy and space programs are both far larger than the comparable German efforts. On civilian development of nuclear energy, Germany will spend something like $175 million in 1965, France $440 million. Unlike Germany, France also has a large military nuclear development program. In 1965 the French will spend $480 million on these military-nuclear items: production of weapons material, development and fabrication of weapons, and development of a reactor to power the planned French Polaris-style submarines. On its civilian space program Germany is spending $35 million in 1965, France $61 million. Both nations contribute about the same amount—$16 to $17 million—to international programs, but France has a much more ambitious domestic program, which includes a tracking network and development of a rocket assembly that should be able to launch a small satellite at the beginning of 1966. (In addition, France's military budget includes $179 million for development of rockets to be launched from concrete silos and nuclear submarines.)

Comparisons, however, should not be allowed to obscure the fact that the German Federal Republic plans to spend a total of about $2.75 billion on research and development annually, starting next year. By 1970, West Germany may be spending close to 3 percent of its gross national product on research.—VICTOR K. MCELHENY