ing that the quantum mechanical law of parity conservation does not hold in weak interactions. Sharing equally in the $5000 honorarium were **Ernest Ambler**, chief of the cryogenic physics section; **Raymond W. Hayward**, chief of the nuclear spectroscopy laboratory; **Dale D. Hoppes**, of the nuclear spectroscopy laboratory; and **Ralph P. Hudson**, chief of the heat division.

William J. McGanity has become dean of the faculty of medicine at the University of Texas medical branch, Galveston. He has been chairman of the department of obstetrics and gynecology at the university.

The California Academy of Sciences has presented its first Fellows' Medal to **Ira L. Wiggins**, who retired last spring as professor of biology at Stanford University. He was cited for his "outstanding fundamental contribution to natural history and systematic botany."

Richard A. Strand, formerly of Pennsylvania State University, has become chairman of the department of electrical engineering at the University of Bridgeport, Connecticut. He succeeds **Andrew I. Peterson**, who has announced plans to retire at the end of the spring semester.

Sydney Chapman has received the Copley medal, highest medal of the Royal Society of England. Dr. Chapman is on the staff of the High Altitude Laboratory in Boulder, Colorado; advisory scientific director of the University of Alaska's geophysical institute; and senior research scientist at the Institute of Science and Technology, University of Michigan.

Robert Glen, assistant deputy minister (research) for the Canada Department of Agriculture, has won the 1964 gold medal award of the Entomological Society of Canada.

The American Society of Plant Taxonomists has elected as president **George H. M. Lawrence** of the Hunt Botanical Library, Pittsburgh.

David H. Rank, professor of physics at Pennsylvania State University, has been named head of the department.

Charles A. Janeway, pediatrics professor at Harvard, has received the 1965 Alan Gregg travel fellowship in medical education from the China Medical Board of New York.

Charles Baker Metz, formerly at Florida State University, has become a professor of zoology at the University of Miami's school of environmental and planetary sciences.

Lewis M. Cline, chairman of the geology department at the University of Wisconsin, has been elected president of the Society of Economic Paleontologists and Mineralogists.

Alan H. Mehler, formerly at NIH, is the new chairman of the biochemistry department at Marquette University medical school. He was chief of the enzyme chemistry section at the National Institute of Dental Research.

Erratum: In the report "Particle size fractionation of airborne gamma-emitting radionuclides by graded filters" by B. Shleien, T. P. Glavin, and A. G. Friend (15 Jan., p. 290), the second sentence of the fourth paragraph should have read, "A rotary blower provided a sampling rate of 1400 liters per minute through the system."

REPORT FROM EUROPE

West Germany Debates a "Cultural Crisis"

Bonn. West Germany, which achieved its postwar "economic miracle" without spending a great deal on research, is entering a decisive period in its educational and scientific development. In the next few years, forces which politicians can control and others beyond their control may test harshly the technical base of German prosperity. Some of the forecasts are so gloomy that there is talk of a "cultural crisis."

As 1965 opens, German scientists and politicians are debating large increases in budgets for science and, at the same time, worrying about a potentially severe shortage of technically qualified people. It will probably be a decade before the yearly totals of university graduates in science and engineering expand. Because of the low birthrates of World War II, the number of students entering the universities is falling each year. Shortages of qualified teachers and budgetary restrictions make it doubtful that there will be much increase in the proportion of students in secondary-school graduating classes who go on to attend a university. Unless programs to recruit talent are very successful, the supply of university graduates in technical fields will lessen, and this could easily offset the effect of increased spending for research which is now being considered by the German Federal Republic.

The number of students completing technical courses at the university level necessarily affects a nation's technical and economic strength, thus the trend of Germany's industry and economy may make a sharp downturn in the next few years. According to forecasts made in 1963 by the Organization for Eco-

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nomic Cooperation and Development, France by 1970 will have 220,000 science and engineering students in university-level institutions [more than the totals for West Germany (79,000) and Great Britain (96,000) combined], and even Great Britain will be expanding her totals faster than Germany. According to these forecasts, by 1970 about 49 percent of French students at this level and 52 percent of British students will be in science and engineering, whereas the figure for Germany will probably hold steady at about 34 percent. An important implication of these figures is that France could count on a generous supply of scientists and engineers for such programs as the construction of a deterrent force, and would have sufficient manpower to play a strong role in a more closely integrated European technological effort in the future, if American competition forces such an effort. Germany's role would be diminishing.

Government Spending Policy

Such figures make for pessimism in discussions by Germans of their nation's "cultural crisis," or *Bildungskatastrophe*, as one recent book calls it. Scientists and other intellectuals in such a pessimistic mood draw small comfort from the fact that policy for education and science has become an issue in the 1965 campaign for seats in the Bundestag, West Germany's parliament.

Much has been achieved, after all, without passionate political involvement. Spending on science by the central government has more than doubled since Sputnik, without much pressure from Christian Democratic chancellors Konrad Adenauer and Ludwig Erhard. Research on thermonuclear fusion has been initiated at an institute in Garching, a suburb of Munich. Reactor development centers have been started at Jülich and Karlsruhe. A new German ship for research in oceanography has joined the International Indian Ocean Expedition, and an electron synchrotron in Hamburg is now being used for research. Budgets for the Max Planck Society's group of independent laboratories and for the German Research Association, a semipublic agency, have been increased steeply. When professors urged that the number of full and associate professorships in the 11 states of West Germany be increased from 3100 to 4300, the Bund government approved; unfortunately, about 20 percent of the 1200 new chairs have not been filled, for lack of qualified applicants. Plans for the establishment of at least three new general universities and one technical university have been approved, after recommendation of this step by the central government's Scientific Advisory Council.

Of course, some factors, such as the size of classes entering the university, are beyond any influence now. And some problems, even if attacked vigorously by politicians, will yield only slowly; the teacher shortage, acute in the sciences, is an example. It is the teacher shortage that makes a scientist like Adolf Butenandt—Nobel prize winner, director of the Max Planck Institute for Biochemistry in Munich, and president of the Max Planck Society—declare that "science teaching in our [secondary] schools is truly steering towards a catastrophe. . . . In a few years, a number of our large states will hardly be able to fill one half of the mathematics teaching positions."

In discussing the problems which do seem amenable to political action, observers are critical of the general political attitude toward science and education, and of government machinery for making science policy. They think the attitude is indifference and the machinery is weak.

It seems that the distribution of power in the German Federal Republic is such that no orderly policy for science can emerge without active intervention on the part of the Chancellor. Adenauer concentrated on issues like general economic expansion, not science policy, and Erhard has done the same; only recently has a science ministry been formed. Critics assert that, because there is no provision for experts to enter high levels of the civil service, the position of scientists within this ministry is relatively weak. The science minister himself is just one individual in a cabinet which contains many other ministers responsible for scientific laboratories. In order to impose a science policy on men of equal rank he must have help from the Chancellor. The present science minister, Hans Lenz, has exercised little influence since he succeeded Siegfried Balcke in October 1963, when Erhard became Chancellor.

There are other divisions of responsibility built into the 1949 constitution of the German Federal Republic. The constitution assigns basic responsibility for education and science (in German tradition the two are always linked) to the states. They have taken the lead in spending for universities and laboratories, even though the constitution gives the central government responsibility for insuring equality of opportunity in all parts of Germany. The central government has not moved into a position analogous to that of the American federal government in this regard. In supporting the German Research Association (equivalent to the National Science Foundation) or the Max Planck Society or the applied reseach laboratories of the Fraunhofer Society, the Bund government and representatives of the states must sign agreements. Although the federal government makes an increasingly large contribution ($75 million in 1965) to university costs, the Bund is not continually increasing its share of the budgets of joint enterprises. Recently, both federal and state contributions in support of the Max Planck Society and the German Research Association have mounted steeply, but the increases have been haphazard.

Shared Responsibility

In 1965 a new agreement takes effect. Now, the states and the central government are to share equally the cost of supporting each organization, apart from costs covered by private contributions. In practice, the agreement means that the states must find a lot of new money for support of the German Research Association, somewhat less for the Max Planck Society. The division of responsibility for education among 11 states has another important effect: wide variation, from region to region, in the spending, per inhabitant, on schools, and in the proportion of individuals in the appropriate age group who finish secondary school. This variation has persisted ever since the unification of Germany in 1870.

The division of responsibility also has complicated the problem of paying for projected university expansion over the next 10 to 15 years. The costs of creating and operating the proposed new universities, technical universities, and medical schools may reach several billion dollars in that period, according to informed estimates, but the states have agreed only on a cooperative program costing $1 billion, and this money would go only for universities and technical universities. Unsolved are the questions of where the additional money will be found for the projected

medical schools in the states of Schleswig-Holstein and Niedersachsen. Neither state has the necessary revenue. Meanwhile, the demand for university buildings is so great that the central government has had to abandon, at least temporarily, the policy of paying 50 percent of the cost of each building, despite an increase in the central government's contribution to university expansion from $50 million in 1963 to $75 million in 1965.

Neither the ruling Christian Democratic Party nor the opposition Social Democrats, who are strongly challenging it, are forgetting the political impact of situations like these. When Erhard became Chancellor in 1963, after many years in the shadow of Adenauer, he declared to the Bundestag that the tasks of education and research have for this generation of Germans the same significance that the social problems of the 19th century had for people of that time. Erhard made education and science one of three cardinal points in his government's program. But, a few months later, intellectuals were accusing him of forgetting his promise. Last November, however, Erhard said in a speech in Hamburg that the central government must soon double its spending on science, in order to hold down the number of German scientists migrating permanently to the United States. In an interview published in the newspaper *Die Welt* (2 December), science minister Lenz said the cabinet was considering publication of a report urging that spending on science be doubled by 1970. Lenz noted that science spending had, in recent years, increased faster than the general budget by some 15 percent a year, but still had been tied in a general way to increases in the budget as a whole. The purse strings, he said, might have to be let out a little more for science, but he warned that the states must not pull theirs tighter in consequence or the whole program would be harmed.

Publication of this report, which includes a long summary of the efforts made in the past to stimulate German education and science, has since been approved.

Meanwhile, the Social Democratic Party has not been idle. The party is much more confident this year than it was in 1961, the first year Berlin's Mayor Willy Brandt was the party's candidate for Chancellor. Erhard's government has proved less strong than Adenauer's and the Social Democrats have done well in some important local elections. During an ebullient preelection party meeting at Karlsruhe they named a scientific advisory committee, including many scientists who had worked earlier on a party-related committee. The gesture was marred only by the public refusal of Ludwig Raiser, the law professor at Tübingen who heads the government's Scientific Advisory Council, to join the new committee. On 9 December the Socialists precipitated a 6-hour debate in the Bundestag on cultural policy.

Unified Program Sought

Observers are skeptical, however. They wonder if the politicians' interest will last. Is their interest likely to go beyond the mere expansion of research budgets and the creation of new universities with essentially the old organization? Critical observers feel that a great many fundamental reforms in Germany's structure for intellectual work are needed. Among these they list a great expansion of the secondary schools according to a national plan; an increase in the supply of teachers; reform of universities and laboratories to encourage teamwork (notably lacking in Germany) and liberate younger researchers; encouragement of research collaboration between firms in various industries; increases in private support for science, beyond the $25 million available each year from the new Volkswagen Foundation and the sums contributed through the Donors Association for Promoting Arts and Sciences in Germany; measures to permit more nonteaching researchers to join university research groups; steps to end the present quite rigid separation between engineering studies and the curriculum of the classical university; and measures, such as flexible pension plans, to permit easy transfer of technically qualified people into and out of industries, government, independent research laboratories, and the universities.

In short, the observers are asking for a much more flexible structure. Despite such progress as the establishment of multiprofessor departments in a few universities, these critics think progress is discouragingly slow. They are distressed by an apparent tendency on the part of West German professors to withdraw from politics and industry, a tendency reinforced by 12 years of Nazi rule.

An outside observer could easily be led, from the discussion of Germany's "cultural crisis," to take an excessively gloomy view of her propects in science. It must be remembered that many of the statements are weapons in a battle which German scientists are beginning to fight. Certainly the officials of the German Research Association, the Scientific Advisory Council, the Volkswagen Foundation, and the Max Planck Society do not intend to stop lobbying for improvements. The small staff of the Scientific Advisory Council, in issuing reports on the number, the space requirements, the enrollment, and the organization of Germany's universities, has written the basic texts on which the current agitation is based.

It is easy, also, to overemphasize the importance of percentages—percentages of technical workers in the total population or of gross national product spent on scientific research. This point has been forcefully made in an article by political economist B. R. Williams of the University of Manchester, in the quarterly journal *Minerva* (Autumn 1964). Williams thinks there is evidence that Germany, while spending at half Britain's rate of spending, has employed her technical resources more efficiently for civilian economic growth. He says that as much as half of Britain's research budget may go for projects that have little or no effect on economic growth. He wonders whether the Germans are not distributing the manpower they have more appropriately between fundamental research and development.

Williams has few prescriptions to offer about the right distribution of technical manpower between research and development, but he thinks European countries probably should aim at a proportion of scientists and engineers below that of the United States. The future growth of research and development will be no automatic upward spiral, he says. Instead it will depend on trade policies, population growth, military budgets, and social factors such as the demand for leisure versus the demand for material goods.

In the light of such views, Americans concerned about U.S. research priorities will find it interesting to watch the effects of Germany's "cultural crisis" on her economy. Well or poorly understood, policy for science and education is becoming a political issue in West Germany.

—VICTOR K. MCELHENY