being made available by reductions in defense spending. In a passage which could not have been congenial to his aerospace audience, Weidenbaum suggested that the proper way to plan for a postwar economy is not to look first at the existing technical capability of industry and then decide what civilian needs to apply it to. Instead, he said, we should first identify the highest priority civilian needs and then seek the best way to fulfill these needs. This latter approach, of course, opens up the possibility that the aerospace industry, which is already in a decline, might lose out in the competition for civilian work and thus continue to decline even more precipitously. That prospect does not alarm Weidenbaum. "Change is an essential aspect of modern society," he said. "This should not surprise us as we have seen in recent decades the tremendous expansion of the aerospace industry require attracting people and capital from other parts of the economy, often to the discomfort and displeasure of those other companies and their employees, stockholders, and suppliers. Pleasant or not, we should not expect that type of movement always to be in one direction."

In an interview with *Science*, Weidenbaum stressed that his remarks applied mainly to the "D" part of R & D, but he also called for more rational analysis of basic research spending. Weidenbaum's speech had quoted favorably remarks made by Lee A. DuBridge, President Nixon's former science adviser, in which DuBridge said that technology should be subjected to a cost-benefit analysis but "a national policy for science should be to use our scientific talent to its maximum potential continuously and hopefully to stabilize the budget for scientific discovery as much as possible." In the interview, Weidenbaum said he thought science should have fairly level funding in terms of real purchasing power so as to offset the inroads made by inflation and avoid the "tremendous swings of a feast and famine cycle." However, Weidenbaum expressed dissatisfaction with the analytical underpinning of most science budgeting. He said that in allocating funds for basic science "we need greater understanding of the annual increment of funding by fields and of the base of the investment to help us identify those fields that merit higher priority." Weidenbaum said he was not proposing "a plan for less support of science and technology" but instead was calling for "a more intelligent application of that support."

That Weidenbaum believes it is only fair to make scientists justify their projects more intelligently was made clear in his speech. "We now expect such greatly maligned types as administrators of social welfare programs to make these benefit/cost calculations to support their budget requests for new training, health and antipoverty programs," he said. "I see great charm in extending the use of the scientific method to public resource allocation in the areas of science and, especially, technology."—PHILIP M. BOFFEY

Labor-Campus Link: Union Heads, Academic Leaders Discuss Alliance

Cambridge, Mass. A group of top national labor leaders and politically active academics held discussions here 16 October aimed at eventually forming an academic-labor alliance "to achieve common social and political objectives." The meeting, a 5-hour session at the Harvard Faculty Club, was attended by some 50 persons, including Leonard Woodcock, president of the United Auto Workers; Nat Weinberg, director of special projects and economics, U.A.W.; Jack Sheehan, legislative director, United Steelworkers of America; Jerry Wurf, president, American Federation of State, County, and Municipal Workers (the fastest-growing union in the nation); Anthony Mazzocchi, legislative director, Oil, Chemical, and Atomic Workers Union; and Cleveland Robinson, a former associate of Martin Luther King and a civil rights leader.

From the universities came three Nobel prizewinners: George Wald, of Harvard, Salvador Luria, of M.I.T., and Albert Szent-Györgyi, of the Marine Biological Laboratories, Woods Hole, Massachusetts. Also present were Jerome B. Wiesner, science adviser to President Kennedy, and now provost of M.I.T.; Douglas Dowd, the Cornell University economist; Howard Zinn, professor of political science at Boston University; and Wassily Leontief, Henry Lee Professor of economics at Harvard. Students present included Joseph Rhodes, Jr., a junior fellow at Harvard and the sole student member of the President's Commission on Campus Unrest; and David Ifshin, president of the National Student Association.

After the meeting, the group issued a statement drafted by Wald and signed by 27 of those attending. It said, in part: "The most urgent concerns of American workers—among them peace, racial justice, job security, decent environments in which to work and live, adequate medical care and social security, housing, schools, stable prices—all represent equally the needs of students and faculty members." The statement criticized the "tendency" of universities to align with big business rather than with labor. "It is high time that this great and powerful force in American life began to play a larger part in our universities," it said.

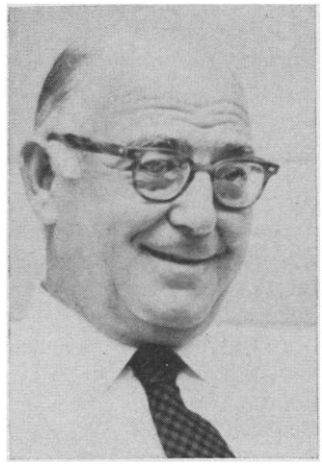
The group agreed to meet again to locate specific social and political issues on which the two elements can work. Possibilities under discussion are a unionlike faculty and student organization, and formal support for the General Motors strike. Another type of activity would be faculty and student research on labor legislation. Endorsement of bills, such as the Occupational Health and Safety Act of 1969, now before congress and strongly supported by U.A.W., is another example.

The meeting was largely the brainchild of Wald, a Nobel laureate for his work in vision, and, in recent years, a popular figure on the student left. Wald traces its origins to two events of last summer: the joining of a local of the teamsters' union by a group of faculty members at the University of Wisconsin at Whitewater, and a statement by Victor Reuther of U.A.W. that "there are people in this country who are trying to divide the workers

POINT OF VIEW

From an address, "The Responsibilities of Reason," by William D. McElroy, director of the National Science Foundation, 12 October, at Indiana University.

. . . I sometimes wonder about the dangers of those who exult reason at the expense of all else, with those who analyze a rainbow and miss the magic of the color. In my view, the science community generally should consider more carefully what Professor [Dwight] Waldo [political science department] of Syracuse and others have termed "the new romanticism," emphasizing man as an emotional and feeling creature as well as a reasoning one. A healthy dose of this view may counterbalance some of the extreme emphasis upon rational thinking I suspect is endemic within the science community.



At the same time, I trust most of you appreciate the point that disciplined rationality is at the heart of man's best work in science. Even our scientific radicals—Einstein, Freud, and Pasteur for example—overturned tradition through the process of painstaking reason. From the vantage point of history, scientific reasoning coupled with creative imagination is a powerful revolutionary agent.

Now . . . let me comment briefly upon the responsibilities of reason as they affect certain Federal, state, and university relationships. . . .

My thesis tonight is that the march of events has significantly compromised each of these relationships, that accelerating change should force us to reexamine their reasonableness and devise new approaches which are both more rational and more responsible. . . . Just as certain fields of science occasionally come to an impass and force a close reexamination of the conventional wisdoms, so must we now reexamine these key relationships between Federal and state governments and the universities. . . .

► Is it reasonable to increase and decrease funding levels so precipitously that serious difficulties result on the campus? . . .

► Is it reasonable, is it responsible for states to increase the bureaucracy and decrease the flexibility of their universities by requiring, for example, that personnel and accounting practices be uniform with a dissimilar state agency like a highway department?

► Is it reasonable and responsible for university leaders to advocate a universal university, one that tries to be active and of high quality in every field? With resources so limited, can we afford this academic chauvinism?

► Is it reasonable to expect a university to be able to put together a single program when they have to negotiate with two, three, or more Federal agencies, each with different policies and practices? . . .

► Is it reasonable to expect the American public—generally apathetic about science anyway—to support science through their elected representatives when neither the science community nor the universities make much effort to acquaint the layman with issues that affect him?

► Is it reasonable to have a graduate system emphasizing research exclusively (and of course the concurrent high expense) when many of the consumers of the graduate school's products are urging a deemphasis of an exclusively research degree? . . .

I believe we can and must effect change in the system to reflect the new realities. . . . No one can enumerate these changes in detail, of course, for it is axiomatic that they must evolve from the mutual interaction of all parties to the relationship. But let me list some benchmarks or criteria which could measure our success.

► Recognition of our colleges and universities as national assets, and as such at least partially a national responsibility.

► The fiscal and policy stability which allows rational planning, but which also provides rational change without major disruption to the policy apparatus.

► The fullest possible measure of freedom for the academic institution to plan and manage its own destiny.

► Complete academic freedom for citizens of the academic community. This is the freedom of rational men, and does not include violence, disorder, and systematic discourtesy to other members of the community. . . .

I hope I have not given the impression that we should modify our institutions so that science can simply be more efficient. Science exists to serve society, not the other way around. I admit some scientists may have given the latter impression and, even worse, a few may still believe society is obligated to support their work without a shred of justification. Those citizens who attribute these views to the mass of scientists are building a convenient strawman. The reality, from my experience, is quite the opposite; the science community has recently given every indication that it is willing to direct its energies to socially relevant science problems. . . .

There is always a possibility of overreacting in this direction to the detriment of good science—I have heard some cynics refer to last year's AAAS meeting in Boston as the "scientific Woodstock"—but we are far from that point yet.

Scientists have often been prideful to a fault about the neutral values of science. We have carefully not allowed our personal views to extend beyond what might be called the inner wisdom of the science process, which we believe leads to a closer approximation of the truth. We have specialized in value-free judgments, somehow seldom relating this to application, and have often failed to relate our knowledge to the concerns of the average man. . . .

Scientists are groping for ways to meld the humanistic values of conscience with the scientific methods of curiosity. To negate this spirit is to deny full responsibility to the rational man. . . .

from the students. It is as cold and calculated a strategy as the southern strategy, but there are no two groups that have more in common than working people and students." In July, Wald wrote to U.A.W. president Woodcock and proposed a joint meeting, to which Woodcock agreed. Wald invited the university people; Woodcock invited the representatives of the labor unions.

Professor Wald's own view of the need for a labor-university channel is that labor, as well as universities, are threatened by backlash and current legislation aimed at tightening national security. "The attack on the universities," he told *Science*, "which now looms large, is only the coating on the pill. The interior of that pill is an attack on the working man." He believes some of the latest legislation in Congress can bring universities "under federal jurisdiction" through financial controls.—DEBORAH SHAPLEY

The author is an associate editor of the M.I.T. Technology Review.

Nobel Peace Prize: Developer of High-Yield Wheat Receives Award

Late in 1944, four young American agricultural scientists assembled in the hills outside Mexico City. Their mission was to export the U.S. agricultural revolution to Mexico. They believed that the application of science to agriculture could achieve the same results in the poor countries as it had in the United States. Like Mao Tse-tung, they believed that the future of these countries would be decided in the countryside. Last week one of these scientists, Norman Borlaug, was awarded the Nobel Peace Prize for his work in developing the high-yielding varieties of Mexican wheat which have so dramatically expanded the food supply of the hungry countries in recent years.

It is noteworthy that the prize was this year awarded to a scientist rather than to a statesman or political figure, a recognition of the extent to which scientific effort can constructively influence the human condition and the prospects for peace and stability. At a time when science is under increasing fire, the Nobel Awards Committee's action is somewhat reassuring to the scientific community.

Born of Norwegian stock in Cresco, Iowa, in 1914, Borlaug has devoted virtually his entire working career to the development of more efficient higher-yielding wheats. A product of the land-grant educational system, he received his degrees from the University of Minnesota—his B.S. in forestry and M.S. and Ph.D. in plant pathology. Borlaug has lived in Mexico most of his adult life, enjoying both the freedom given him by assured financial support from the Rockefeller Foundation and the challenge posed by the hunger that afflicts a major share of the human family. His Yankee ingenuity is widely appreciated by the wheat farmers of Mexico, who have recognized him with awards on at least three separate occasions.

The other members of that four-man team assembled in 1944 were Edward Wellhausen, corn breeder; William Colwell, agronomist; and George Harrar, plant pathologist. The composition of the group must be considered one of those fortunate coincidences of a few talented people being brought together and, as a result, influencing in a major way the course of history. This team was recruited and assembled by Harrar, who became president of the Rockefeller Foundation in 1961. Wellhausen is today director of the International Center for Corn and Wheat Improvement, an enlargement of the original Rockefeller effort, now jointly supported by the Ford Foundation and designed to serve the entire less developed world.

When the four young scientists arrived in Mexico in 1944, it was a hungry country, importing much of its food from the United States. By 1970, wheat production had more than tripled, and the average Mexican was consuming 40 percent more food. Wheat was being exported, and the economy was prospering.

Norman Ernest Borlaug

As director of the Rockefeller Foundation's wheat breeding program, Borlaug set out during the 1950's to develop a dwarf wheat that would perform well in the varied conditions of Mexico. He amassed germ plasm from Japan, the United States, Australia and Colombia, and then began growing two alternate crops of wheat each year at two different sites, a summer crop just south of the United States border and another crop in winter near Mexico City, some 800 miles away. The two sites differed in day length, or photoperiod, as well as in many other environmental factors. The combination of the cosmopolitan ancestry of his seeds and the two varying sites enabled Borlaug to produce a dwarf wheat variety that was remarkably adapted to a wide range of growing conditions. The Mexican dwarf wheats today are growing successfully throughout the broad latitudinal range from Turkey to Paraguay. This geographical adaptability was something new in cereal breeding, a distinguishing characteristic of Borlaug's dwarf wheats. Hitherto, most cereal varieties had performed well only under conditions comparable to those in which they were first bred.

The second distinguishing characteristic of the Mexican high-yielding wheats developed under Borlaug's direction is their high-yield potential. When farmers attempted to fertilize heavily the tall, thin-strawed traditional varieties of wheat, heavy sets of grain often resulted, but, because they were thin-strawed, the grain fell over, or in the agronomist's lexicon, "lodged." The new dwarf varieties, scarcely half as tall and with much stiffer straw, are very responsive to fertilizer. This imaginative feat of biological plant engineer-