scientists *are* less interested than most educated men in esthetic matters and social affairs. Perhaps "the discipline" of science *does* narrow a man's interests, does create a group who do not meet the cultural ideal of the broadly educated man. If so, the "solution" is not to be found in an aping of Madison Avenue but, as Snow has also argued, in a more general appreciation on the part of the intellectual community of the demands the scientific mode of thought makes upon anyone, professional scientist or not, who seeks an objective understanding of the world around him. Perhaps, also, scientists have "over-conformed" to their own image of what a scientist is, and perhaps the reality can change as more of them develop the broader interests and cultural appreciation constantly called for by liberal educators.

A final stance for the scientist consists in recognition of the possibility that to be a scientist is indeed to be different. The studies of Roe (*12*) and of Thorndike and Hagen (*13*) have shown that scientists tend to have characteristic developmental histories and personality structures. It may be that in order to do their work, recruits to scientific careers require some of the qualities which, in extreme form, appear in the stereotype of the scientist. If so, cannot the scientist accept this and get on with his work?

References and Notes

1. H. H. Remmers and D. H. Radler, *The American Teenager* (Bobbs-Merrill, Indianapolis, 1957).
2. M. Mead and R. Metraux, *Science* **126**, 384 (1957).

3. E. W. Harbinger and A. LaCava, Wesleyan undergraduates, assisted us in this study. The research was carried out under a contract with the U.S. Office of Education, Department of Health, Education, and Welfare. Additional support was provided by the Faculty Research Committee of Wesleyan University.

4. The occupations that were studied are listed in Table 1.
5. The form of the questionnaire and some of the scales are taken from the work of C. E. Osgood [for example, C. E. Osgood, G. J. Suci, P. H. Tannenbaum, *The Measurement of Meaning* (Univ. of Illinois Press, Urbana, 1957)].
6. The data were collected during 1958 and 1959.
7. A summary of the entire study appears in "College Student Images of a Selected Group of Professions and Occupations," *Final Report, Cooperative Research Project No. 562, U.S. Office of Education* (Wesleyan University, Middletown, Conn., 1960).
8. This study was made by D. H. Bogart, a Wesleyan student.
9. National Opinion Research Center, in *Class, Status, and Power*, R. Bendix and S. M. Lipset, Eds. (Free Press, Glencoe, Ill., 1953).
10. The interviews were conducted by E. W. Harbinger, of Wesleyan.

11. C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge Univ. Press, New York, 1959).
12. A. Roe, *The Psychology of Occupations* (Wiley, New York, 1956).
13. R. L. Thorndike and E. Hagen, *Ten Thousand Careers* (Wiley, New York, 1959).

Science in the News

The Budget: Kennedy Asks for Science Increases beyond the Increases Ike Recommended

The Kennedy budget recommendations include substantial increases for scientific research, which come on top of the already substantial increases provided in the final Eisenhower budget. In both cases, on a percentage basis, the increases are sharpest for basic research.

Eisenhower recommended an increase of nearly $800 million for overall research and development. This was an increase of about 9 percent, and about 4 times as great a percentage increase as he recommended for federal spending in general. Of the science increase, about $200 million was for basic research, which is a 25 percent increase over the $810 million being spent in the current year and, of course, about 12 times as great a percentage increase as he recommended in overall federal spending.

The details of the Kennedy budget are not all available at the time of this writing. But the over-all increase, exclusive of that for defense research and development, where figures were not available, amounted to around $150 million, with the largest gains for space, oceanography, the National Institutes of Health, and the National Science Foundation.

The National Science Foundation increase, almost all of it for basic research, is $29 million, which comes on top of a $39 million increase already recommended by the Eisenhower budget. This is about a 65 percent increase for the agency, whose research budget last year was just under $90 million. How much of this increase survives the Congressional budget review will offer a fair test of the new Administration's effectiveness in selling Congress on the idea of more support for basic research.

Basic Research and Congress

The difficulty of arousing Congressional enthusiasm for basic research showed up in what happened to Eisenhower's budget requests last year. The following figures, unlike others in this report, are for new obligational authority rather than actual spending. (Congress might, for example, appropriate $100 million in the fiscal 1962 budget for a project that will take 3 years to complete: actual spending in fiscal 1962 might be only $35 million; the rest would be spent in fiscal 1963 and 1964. The figures are for obligations, that is, they include such things as orders placed which will not be filled and paid for until a later year. Actual spending is somewhat less.)

Eisenhower last year requested just under $8 billion for research and development for fiscal 1961, which ends this June. This was a slight decrease from the previous year. Although Congress, as it always does, cut the overall budget requests of the President, it did the opposite with research and development. It gave the President $554 million more than he had asked for. But this increase did nothing for basic research: here Congress cut Eisenhower's requests back from $880 million to $850 million.

In the Defense Department, basic research was not cut, but it received no share in the increase (nearly $500 million) Congress added to the budget for research and development. In the National Institutes of Health, where basic research makes up about a quarter of the research budget, Congress added $4 million for basic research,

$85 million for applied research. The National Science Foundation, which supports only basic research, had its research budget cut from $84 million to $76 million. The Space Agency got $58 million above Eisenhower's request for applied research and development, but its basic research was cut $20 million.

What this suggests is that Congress has to be sold on proposals for basic research, while it is quite ready to provide money for applied research and even readier to provide money for development. The reason, of course, is that the more specific you can be about what you are getting for your money, the more money you can get, and basic research, by definition, is that area where you cannot be specific about what you are getting for your money.

The figures show no general antagonism in Congress to basic research: basic research suffers only in comparison with what Congress is willing to spend on applied science and technology, but the cuts in requests for basic research funds are no greater than those Congress normally makes in the President's budget.

Attitudes of Congressmen

Ten years ago it would have been quite easy to find influential members of Congress who would have responded to a question about basic research with a blank look. Today it is just about impossible to find a Congressman of any influence who cannot give a reasonably coherent definition of basic research and of why it is something to spend money on.

Congressman Albert Thomas of Texas, who uses his power as chairman of a House appropriations subcommittee to regularly cut the research budget of the National Science Foundation, which comes under his review, is the special bane of supporters of basic research. Thomas is unenthusiastic about government spending in general. But when asked recently about the value of basic research he replied: "Basic research is the only *real* research; the rest is just applications. We realize that on a day-to-day basis it looks like you're throwing money in a rat hole, but comes some Saturday night and the whole thing pays off." This is not quite the way James Conant might phrase it, but it is a long way from former Defense Secretary Wilson's "Basic research is when you don't know what you're doing."

Nevertheless, the fact remains that the area where the scientific community would most like to see increases is exactly the area where it is most difficult to get Congress to accept increases, and this despite the fact that basic research projects are generally far cheaper than other types of research projects.

The Budget Message

Shortly after Eisenhower presented his last budget, just before Kennedy's inauguration, the *Wall Street Journal* ran an analysis of it which called it a "political joke on the incoming Administration," meaning that the budget, although on paper it showed a $1.1 billion surplus, was in fact almost certain to produce a deficit even if Kennedy added nothing to it. This meant that Kennedy, even if he forgot all his campaign talk and introduced no new programs, would still be liable to a charge that he took over a balanced budget from the Republicans and was somehow responsible for unbalancing it.

Kennedy, with feats of logic that would delight Lewis Carroll, carries this game to a new level. He cites his pledge in his State of the Union Address that "barring the development of urgent national defense needs . . ." his programs would not "of and by themselves unbalance the earlier budget." In the context of the message the "urgent defense needs" referred, quite clearly, to actually new needs, rather than the needs that Kennedy and many other people have been talking about for over a year.

But the budget message shifts this ground quite deftly. All increases in defense spending are now assumed to be urgent new needs, and therefore the determination as to whether the new Administration is trying to balance the budget is to be made solely on the basis of what it is doing about nondefense spending. This is the first step.

Kennedy then demonstrates that *if* Eisenhower's budget were accurate and *if* defense increases are not to be counted, then his budget *would* be balanced. *Therefore* the new Administration can be supported by right thinkers, who realize that no Administration could deliberately unbalance the budget and at the same time retain any claim to fiscal responsibility.

In fact, of course, the Administration had decided on a deficit in order to stimulate the economy—a course that is considered eminently sound and responsible by most of the country's economists. The more serious portions of the message make this fairly clear, and a recent lengthy report from the Council of Economic Advisors to the Congressional Joint Economic Committee offered a detailed account of the reasoning behind the Administration's policies, although the less palatable notions were never put into blunt enough language to mean much to someone without some familiarity with economics.

This is the heart of the curious nature of the budget message. Anyone who has mastered an introductory course in economics has no reason to be confused about what the Administration is doing. He may not agree, but he should not be confused. The less popular notions are expressed in technical language, but it does not take a Ph.D. in economics to translate "stimulate demand" into "spend more money."

The message makes perfectly clear that Kennedy anticipates a deficit of $2.1 billion from his domestic program plus $2 billion from the defense program, for a total deficit of about $4.1 billion. For the rest, the message is simply taking advantage of the public's lack of sophistication.

The lack of any great public outcry about Eisenhower's five unbalanced budgets, not even about the record $12.5 billion deficit in fiscal 1959, suggests that the public does not really expect the budget to be balanced at the end of every year. This does not prevent the public from expecting its elected officials to talk about a balanced budget at the beginning of every year. And as long as political leaders must talk about balanced budgets in order to maintain their popular support, they do not have much choice but to do so.

The largest single category of nondefense increases was for education. Here the net increase (some Eisenhower programs were replaced by Kennedy programs for the same purpose) was over $500 million. The science increases, while not as great, were given special emphasis in the budget message, and seemed satisfactory to people concerned with science policy. Budget officials said that the Administration had gone out of its way to fit in as much extra money for science as possible, within both the limitations of the size of the budget and the limited num-

ber of changes that it was possible to make in the Eisenhower budget. (Making the budget is a year-round job. The new Administration is limited in its budget changes by the limited amount of time that it has to review the budget before Congress must begin to act on it.)

How many of the recommendations will actually get through Congress, and how much room there will be in future budgets for similar program expansions, depends in large part on how successful the Administration is in winning support, or at least acceptance, of its over-all economic policies. The necessity and difficulty of winning this support made the budget message the most peculiar thing of its kind the American public has ever had occasion to ponder—H.M.

News Notes

Page Charges in Biological Journals

The Conference of Biological Editors at its 1961 annual meeting studied, in both a work session and a general session, the matter of page charges by biological journals of primary publication. (Page charges were defined as partial costs of publication of a paper, payable not by the author but by the institution, or from the fund, that supports his research.)

Among the factors which have led to consideration of page charges are the following.

1) Support of research by federal and private funds since World War II has enormously increased the amount of material to be published, but the number of journal subscribers has not increased proportionately, partly because of increased subscription prices.

2) Still higher subscription prices militate against wider circulation to individuals and impose severe hardships on institutional and library budgets, which have not benefited directly from the availability of federal and private grants for research. Such hardships and deterrents to circulation are even more acute abroad than in this country.

3) On any but a temporary basis, direct government subsidy to *selected* journals is undesirable, and direct support of *all* seems impracticable or unnecessary. Indirect subsidy, through payment of page charges, leaves wide freedom of choice to individuals as to which journals to support by submission of their research papers for publication.

4) Several journals of the American Institute of Physics have satisfactorily used a system of page charges for 25 years or so. Other journals, including a few in biology, have had satisfactory experience with the system over a shorter period. During this time federal policies and public laws have been modified explicitly to permit the payment of page charges from federal research grants as well as from appropriations to government laboratories.

5) For many years it has been common practice for journals to charge "excess publication costs" for tables, engravings, formulas, color, or text pages beyond a stated maximum. Such a policy rewards brevity but tends to restrict arbitrarily the coverage of a report. Moreover, it encourages the practice of fragmenting a research report into several papers, which, together, cost more to publish and are less effective than a single, more extensive, paper.

6) Editorial appraisal of the scientific merits of a paper should be divorced from any questions of cost and charges. Journals of the American Institute of Physics and of certain other societies have accomplished this by deferring any inquiry as to whether or not page charges will be accepted by an author's institution or payable from his research funds until after the paper has been accepted for publication.

A summary statement of guiding principles adopted by the conference, whose membership includes the editors of more than 100 biological journals, is as follows.

Publication is recognized as an essential step in the completion of research. That a portion of publication costs should be borne by research budgets is a corollary of this principle. The CBE considers that a system of page charges, adequately safeguarded to eliminate financial considerations from scientific evaluation of papers, is an acceptable and desirable means for supplementing journal income.

Many systems differing in detail may be devised, but common to all should be these provisions: that the charge should be substantially less than the full cost of publication; that the charge should not be payable by the author personally, but by his institution or the funds that support his research; and that the charge should be imposed only if the author's institution or his supporting funds are able to accept it.

News Briefs

Nuclear power costs. The Atomic Energy Commission has published a 40-page, revised version of *Costs of Nuclear Power.* The pamphlet is available from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C., for 50 cents a copy. It includes information on several new reactor projects, and the text and tables have been revised and expanded to include new data that became available during the third quarter of 1960.

The report has nine major section headings: research and development costs, construction costs by major categories, total construction costs, working capital, annual fixed charges, fuel-cycle costs, cost of operation and maintenance, total generating costs, and objective for competitive nuclear power in the United States. Data on foreign installations are given when they are available; the report gives figures for 30 foreign nuclear power plants and for 22 plants in the United States.

* * *

U.S.-Mexican engineering program. The University of Wisconsin's College of Engineering and the Mexican Institute of Technological and Advanced Studies at Monterrey, Mexico, will cooperate in an unusual program for training American engineering students at the Mexican institution during the next 2 years. The program is the first of its kind to be undertaken by the United States and Mexico. It was made possible by a $100,000 grant from the Carnegie Corporation of New York. The funds will support a junior-year program for Wisconsin engineering students at the Instituto Technologico y de Estudios Superiores de Monterrey. The first year's program is to be a pilot study, involving only University of Wisconsin students. The program may be extended to other universities later.

* * *

Bottles measure ocean flow. Some 30,000 bottles, bobbing on the ocean for more than 3 years, have provided the Pacific Oceanographic Group of the Fisheries Research Board of Canada with data on the circulation of the Northeastern Pacific and Bering Sea.

* * *

Number of diabetics increases. The number of diabetics in the United States has increased greatly in recent decades, the Metropolitan Life Insurance Company reports. There are about 1.5 million known cases of diabetes in this