educational institutions, including federal-contract research centers operated by universities. The House committee report recommended that a total of $46.9 million be cut from the military sciences budget—and it specifically directed the cuts at basic research. "The Committee," it reported, "fully understands that the 'military sciences' program is expected to provide foundational work for weapons systems and military equipment of the future. However, the Committee points out that such foundational work is supported not only by the Department of Defense but by many other departments and agencies of the federal government as well as by industry and by colleges and universities. There is a broad national base of support for scientific and technical investigations. The advancement of scientific knowledge is not dependent upon a continuing increase in the financial support of such efforts by funds appropriated to the Department of Defense. . . . In fact, considering the huge amounts of resources being devoted to the space program, the increasing amounts of research being funded in other Government agencies, and the effort being supported by the private sector of the economy, there seems to be less and less need to increase each year, or even to continue at the present level, amounts appropriated to the Department of Defense to support basic research efforts."

While the leaders of the scientific community argue that an expansion of support for research can only prove beneficial, the committee took a different view. "Continued yearly increases in the Department of Defense efforts in this area could detract from, rather than add to, the sum total of national scientific knowledge to the extent that excessive competition for the interest of capable people, and the frequent job changes which result therefrom, create unnecessary instability in vital programs. There is also reason to believe that research effort, like other forms of human enterprise, is subject to the law of diminishing returns to the extent that it may well be possible at this time, by means of a critical selection process, to curtail or eliminate many lines of investigation already pursued too long without significant or useful results or contributions."

Apparently taking a cue from a theme that is much in the air—namely, that emphasis on research can be injurious to teaching—the committee added: "a retrenchment might, so far as colleges and universities are concerned, have a corollary benefit of making the best faculty more available for the purpose of teaching students." And the committee then endorsed another popular theme by stating that "there is also some evidence that the high level of support of basic work is producing scientific and technical information at such a high rate that it cannot be effectively digested, interpreted, disseminated, or put to useful purpose."

There may be some question about the content of the utopian dreams of the leaders of the scientific community, but their nightmares are undoubtedly taken directly from appropriations reports.—D. S. GREENBERG

Curriculum Reform: Success Hasn't Spoiled NSF Program, But Biology Study's Status Reflects Problems

The curriculum reform movement, largely underwritten by the National Science Foundation, has wrought remarkable changes in what is taught in classes in physics, mathematics, chemistry, and biology in American high schools. These science improvement projects, as NSF calls them, have been highly imaginative and effective ventures in science education, but now the agency appears to be passing through a season of irresolution over what to do next.

NSF is not thinking of abandoning the field. On the contrary, the agency is supporting an increasing number of projects ranging from elementary school to college level. The question bothering NSF concerns the future of the groups which have substantially completed their original objective of fashioning new courses for high school students. In oversimplified terms the NSF's dilemma is one of deciding whether in a specific project it should prime the pump or sponsor a long-term irrigation project.

Formulation of such policy is not an easy task. The major course improvement projects are all based on the same principle—the collaboration with school teachers of able university and college faculty interested in curriculum reform, and a process of classroom testing and revision (*Science*, 8 May 1964, p. 642). But the groups are organized differently, operate under differing managerial arrangements, and deal with different situations in their subject fields.

First into the schools with a course prepared by an NSF-supported group was the Physical Sciences Study Committee (PSSC), whose textbook and accompanying materials became generally available in the 1962–63 school year. NSF does not deal directly with PSSC. The grantee is Educational Services Incorporated, at Watertown, Massachusetts, a nonprofit organization which was originally formed to handle administrative and financial details and produce films for PSSC and which now administers a number of other curriculum and educational research projects as well.

The School Mathematics Study Group (SMSG), which has operated under the wings of Yale and Stanford, is the largest of the math revision projects. SMSG has devoted its main efforts to developing sample text material for grades 7 through 12. Paperback versions are available, but the intent of the group has been to provide models which commercial publishers could draw on. It is understood that the SMSG policy is being reappraised because the degree of emulation by commercial publishers has been considerably less than was hoped for.

BSCS Productivity

At the other extreme, probably, in terms of attitude toward preparation of materials is the Biological Sciences Curriculum Study (BSCS). Activated in 1959, BSCS has produced a remarkable flow of materials, notably three versions of a modern high school biology course, with laboratory manuals and teachers' guides to go with them. While publication rights have been negotiated with commercial publishers on this and other material, including films, BSCS has insisted on maintaining tight control over text and illustrations and on such things as revision arrangements.

BSCS has built up considerable momentum and is involved in, or contemplating, a number of projects which would normally extend into the future. BSCS, therefore, is probably the most heavily affected by the current NSF examination of its relations with established groups.

The BSCS situation is clouded by a major management problem. BSCS was originally established, with NSF funds, under the aegis of the American Institute of Biological Sciences, the major national organization of biology's scholarly societies. In 1963 the rapidly growing AIBS was put under sanctions by NSF for misuse of NSF funds (*Science*, 25 January 1963, p. 317). Under a tri-

partite agreement among NSF, AIBS, and the University of Colorado the NSF grant to support BSCS was transferred to the University of Colorado for administration. BSCS headquarters had been established at Boulder shortly after the project was initiated.

The transfer of the contract was regarded as temporary, and AIBS officials appear to have assumed that when their organization made administrative and financial amends, BSCS would be returned and the old contractual arrangement revived.

About a year ago, AIBS felt sufficiently restored to approach NSF on the question of resuming administrative responsibility for BSCS. After discussion, AIBS came up with a proposal to create a new post, director of education, to be occupied by a biologist possessing both distinction in his field and experience in educational affairs. The director of education would oversee not only BSCS but other education projects which the institute administered. A private foundation agreed to underwrite the cost of the director's salary for a term on condition that the right man were found. AIBS officials hope to have a nominee ready for a governing board meeting in August. NSF has made no commitments but appears willing to see BSCS return to the AIBS fold if a sound base for management is established.

Within BSCS there is more than a little reluctance to see the son return to the prodigal father. The BSCS tie with the University of Colorado has been primarily a housekeeping arrangement, and, before that, AIBS seems to have provided little in the way of guidance or services. During its years of nearly autonomous operation BSCS has produced textbooks which by the test of use are a success—an estimated 580,000 students used them this year, and biology textbook adoptions are running at a rate of about 75 percent for the BSCS books.

Equally significant, say the BSCS partisans, is the fact that support from the scholarly community has been established firmly and that high school teachers "identify" with BSCS because they were genuinely involved in developing the materials.

There is also a lingering resentment inside BSCS because it was not consulted when the tripartite NSF–AIBS–U.C. agreement was reached 2½ years ago. It is also claimed that BSCS tried to maintain professional relations with AIBS after the blowup in 1962 but that virtually nothing was heard from AIBS until a year ago, when AIBS began to explore the matter of taking BSCS back.

Last October the BSCS executive committee, after talks with AIBS representatives, voted against a return to the AIBS fold at that time. It is true, however, that several men influential in BSCS affairs definitely favor an eventual reunion with AIBS. Personality conflicts and also rankling resentment within BSCS upper echelons over past treatment by both AIBS and NSF figured in the situation, but the main BSCS assertion is that it would be folly for BSCS to return to AIBS control unless AIBS and its member organizations first demonstrate genuine interest in the BSCS program.

In the year since negotiations were initiated by AIBS, an added element of uncertainty has entered BSCS operations. The management question has loomed larger, and NSF funds have been granted on a short-term basis, often arriving at the last minute or late. Under these circumstances, planning, short- or long-range, has been difficult and problems of replacing personnel have grown.

Problems of Succession

H. Bentley Glass, who has resigned as professor of biology at Johns Hopkins to become academic vice president at the State University of New York at Stony Brook, last year made it known that he wished to resign the BSCS chairmanship, which he had held since the start of the project, but he was persuaded to stay on until the management issue was settled.

The BSCS executive director, Arnold B. Grobman, the only man besides Glass who has been in the BSCS top echelon since the beginning of the project, has resigned, as of 1 September, to become dean of the college of arts and science at Rutgers. He made it clear that the uncertain state of the BSCS future contributed to his decision.

While support for BSCS among biologists remains high, the present situation will not make it easy for BSCS to make arrangements with a successor to Grobman, and BSCS has asked NSF to resolve the management question by 1 November or allow BSCS to make firm arrangements to operate for at least 2 years. BSCS has explored several alternatives to the present management scheme, but discussions with NSF officials have never progressed very far. The feeling inside BSCS is, as one person put it, "We can't go on in a chronic state of indecision."

For NSF the BSCS management problem, however, is incidental to the larger question of whether a single organization should be supported indefinitely. NSF officials see a danger in such self-perpetuating groups becoming institutionalized and losing vitality.

The NSF attitude is succinctly expressed in two points in a working paper which sets forth some general principles on which policy governing the course content program is to be based.

1) In order to insure against both the development of a permanent cadre of textbook writers who might eventually lose touch with the advances in their fields and the possibility of any one group developing an undue influence or new orthodoxy, the Foundation will not support any one curriculum improvement group indefinitely.

2) Inasmuch as the Foundation's objective is to obtain the development of excellent models, even though the models themselves may be adopted for use, the Foundation will not undertake the support of repeated revisions of given materials.

While NSF sees a danger in too much continuity, BSCS, which has involved more than 2000 people in its work, argues that its ongoing program suffers from too much turnover. Some of the groups, however, have had a life cycle different from that of BSCS. The Chemical Education Material Study (CHEM Study) group, for example, has completed its main work and now operates with a skeleton staff and a steering committee.

Perhaps the most pressing concrete question facing NSF is that of revision of existing texts. BSCS wanted to begin the revision process this summer with writing sessions which would have led to the appearance of a revised edition in time for use in the fall of 1967. NSF declined to finance the sessions this year on the grounds that BSCS has not made clear the nature and extent of the revisions contemplated and because the agency felt the management problem should first be settled.

It is clear that the business aspects of the course improvement program also worry NSF. Copyrights on materials developed are owned by grantees, but royalties are put in escrow and returned to the Treasury. Royalties from the major projects are considerable.

On the one hand, existing groups would oppose letting commercial publishers revise the books independently and probably would be equally reluctant to turn the job over to another group. And on the other hand, NSF is determined above all to avoid being a party to the creation of anything that amounts to a national textbook.

As a matter of general policy, therefore, the Foundation in the future can be expected to put more emphasis on allotting funds for course content improvement to programs that stress innovation and experimentation rather than implementation in the schools.

The agency, however, faces immediate problems like those involving BSCS. Foundation staff members say that if the return of BSCS to AIBS tutelage proves not to be a workable solution, NSF is willing to consider other arrangements. But, as one official put it, "Negotiations are going slowly." In the case of BSCS, too long a delay in making a decision may be decisive.

—JOHN WALSH

AMA (II): Doctors' Organization Faces Growing Outside Criticism, Wide Range of Policy Problems

The temporary rout, if not defeat, of the "boycott medicare" party at the convention of the American Medical Association in New York last month produced a flurry of assertions in medical circles and in the press that the AMA had reached a "turning point." Whether the association will now take a more positive role in guiding the changes in medicine that medicare and other developments will be bringing about is far from clear. At the moment, most of the omens are negative. But a significant feature of the commentary on the AMA's action is an apparently widespread feeling that the AMA has reached a point at which some kind of "turning" is essential.

The editorial writers and others who feel that the stand taken at the AMA convention presages an era of moderation and cooperation rest their case on two principal points—first, the absence of a declaration of war on medicare, and, second, a rather guarded offer to cooperate with the government in writing the rules and regulations under which the medicare program will be administered. These concessions on the part of the AMA are surely to be welcomed—but there is a good chance that their significance will be limited. In the first place, it is not certain that the AMA leadership would be able to contain a strike by large numbers of individual doctors. Boycott sentiment is particularly strong within the states that introduced boycott resolutions—Arizona, Ohio, Florida, Texas, South Carolina, Louisiana, Connecticut, and Nebraska—and is reported to be heavy also in New Jersey and Kansas. (In general, support for a boycott is believed to be strongest among small-town physicians, with doctors from big cities more disposed to go along quietly, if not happily, with the program.) How long such individual boycotts might continue, or what their consequences might be, no one can say. Many outside observers predict that a strike would fail when doctors discovered that, far from interfering with either their practices or their pocketbooks, medicare would actually improve both. This theory rests on the proposition that, since doctor's incomes are basically dependent on the amount of medical services they provide, any system which tends to encourage more patients to seek needed medical care is good for the doctors as well as for the patients—particularly where reimbursement is guaranteed. Nonetheless, it might easily be some time before such rational economic benefits were perceived, and in the interim a strike—even if not officially endorsed—could impinge on the "moderation" of official policy. The usefulness of the AMA's offer to negotiate with the government on medicare is also open to question, not because it is insincere but because it is accompanied by the old policy of continuing to attack and resist medicare as much as possible. If the AMA has "turned," it is by no means now facing in the opposite direction.

The Next Battle

Outside of these last-ditch changes of attitude toward medicare, the AMA has given few signs that it is about to abandon the style or the precepts which have led to the waning of its influence in both political and medical-scientific circles. First on the AMA's post-medicare priority list is the administration's proposal for federally supported regional centers for research and treatment in heart disease, cancer, and stroke—which it intends to oppose as forcefully as possible. The AMA's suspicions of the proposed centers first became known when Hugh Hussey, AMA director of scientific activities, resigned from the presidential commission working on the proposal, reportedly on the grounds that he foresaw a conflict with AMA policy. When the report was completed, the AMA published a staff report in its journal charging, among other things, that the recommendations rested on unproved assertions about the inability of American physicians to keep up with advances in medical knowledge. At the convention the delegates resolved to oppose "those particular Commission recommendations which call for and have stimulated proposals for hastily contrived and unproven sweeping changes in the pattern of medical research, education, and patient care." This resolution was adopted after considerable debate in which the original wording, which endorsed the intent of the president's commission while opposing its methods, was replaced by wording which omitted praise for anything but "existing patterns of research and medical practice." Later, AMA officials privately confirmed their intent to make the regional centers "the next major medico-political battle." (A bill supporting the regional centers was passed by the Senate on 28 June and sent to the House Interstate and Foreign Commerce Committee, where hearings are scheduled to begin 20 July.)

The AMA is by no means alone in its opposition to the new federal program. It is true that in the Senate hearings the bill was supported by the American Heart Association, the American Cancer Society, the Association of American Medical Colleges, the American Hospital Association, the American Dental Association, and the American Public Health Association, as well as by the influential members of the DeBakey Commission, who invented the scheme. Outside of these groups, however, there appear to be growing numbers of independent physicians and usually sympathetic politicians who are publicly skeptical about some of the bill's assumptions and implications. Even among its early supporters there is a growing tendency to temper the initial rejoicing with caution. But while it is evident that opposition to the bill is becoming respectable, it is unlikely that the AMA's particular objections will find an attentive audience.

Medical politics is something like the children's game in which you can advance only if you remember to say "May I?" Its political equivalent consists of seeming to support proposals even while suggesting changes that would alter or undermine them. The