stance, in the aircraft-noise assessment the study group examined ten different ways of coping with this problem, including such strategies as relocating airports, creating buffer zones around airports and exercising other land-use controls, requiring more surface transportation, and modifying aircraft hardware and flight profiles. The latter alternative seemed preferable from the standpoint of a majority of the affected groups to any other single course of action, but the report suggested some combination of alternatives might provide the best answer.

Analysis of this kind is simple by comparison with that required for a "technology-initiated" assessment such as that of the use of television and the computer in higher education. The report observed that:

> While the problem-initiated assessment focuses on solving a stated problem, the process involved in an assessment of a new technology is better represented by analogy with an inverted funnel. The assessment process begins with the new technology at the small end and emerges as a complex pattern of consequences at the large end. As cause-effect chains diverge, predictability of events diminishes. Picking the winner of a horse race is difficult-enough, and putting money on the daily double is many times riskier. Statistically, if four events in sequence are predicted, each with a reliability of 80 percent, the reliability of the final prediction falls to 41 percent. . . . Thus, the farther that predictions pretend to see, the greater their degree of uncertainty. Still further complexity is introduced when the analysis includes, as it should, the consequences of alternative governmental strategies designed to cope with the effects that have been predicted. For each new strategy considered, a series of diverging cause-effect chains is generated. The number of consequences becomes multiplied by the number of policy alternatives or strategies considered for each. Clearly, any attempt to reach broad conclusions from such a vast array of possibilities is likely to be unreasonably expensive, time-consuming, and inaccurate. Thus it is much more difficult to achieve meaningful evaluation for a technology-initiated assessment than for a problem-initiated assessment. [But] because of the uncertainty and potentially broad scope of the impacts of new technologies, their assessment is probably of most concern to Congress.

In order to cope with the complexity of the technology-initiated assessment, the NAE committee concluded that it often may be necessary to convert it to a problem-initiated study. In the educational TV-computer assessment, the conversion was accomplished by narrowing the study's focus and concentrating on the question of what promise four different levels of federal financial

Basic Research: Congress on Prowl

Congressional debate on a weapons and research bill, which began in July with headlines on the ABM, ended last week with a footnote which could demolish all Pentagon-supported basic research.

Two oddly paired congressional huntsmen are about to join a new foray against such research, armed with what looks at first glance like a rather formidable weapon. The two are Senate Majority Leader Mike Mansfield, (D–Mont.) and House Armed Services Committee Chairman L. Mendel Rivers (D–S.C.). Their weapon is Section 203 of the recently approved military procurement and research authorization bill. Devised by Mansfield to terminate Pentagon support of basic research [and introduced as a Senate amendment by J. W. Fulbright (D–Ark.)], it says the Defense Department shall not finance "any research project or study unless such project or study has a direct and apparent relationship to a specific military function or operation."

In Mansfield's view this language could cut off Pentagon support for about $400 million a year of "non-mission-oriented" basic and applied research carried out mainly at educational institutions and affiliated organizations. Mansfield apparently would like to see the National Science Foundation pick up the tab for such research in the future.

In the view of Defense officials concerned with administering the new law, however, it is "without effect," since "as a matter of policy, and surely as a matter of rhetoric, all the work we support is relevant to military needs." The Pentagon's initial reaction is to carry on as before. Officials say it will be up to Congress to challenge specific projects. In response, Mansfield's staff suggests the General Accounting Office will be asked to keep an eye on the Pentagon's performance.

All this could evolve into nothing more serious than a genteel debate over legal verbiage and some barely perceptible tightening of Pentagon guidelines. But two factors suggest that the new law could have a far more explosive effect. For one, the more the Pentagon insists that all its research projects are defense-oriented, the more ammunition it gives to students and faculty who want to end university-military ties. The other factor is Congressman Rivers.

In earlier House action, to encourage a show of more "backbone" by academic administrators, Rivers' committee ordered the Pentagon, in the authorization bill, to give 60 days of advance notice before awarding new grants or contracts for academic research, and to inform Congress of each school's record of cooperation with the military. The provision elicited strong opposition from the White House, the Pentagon, and the scientific community (*Science*, 10 October).

The provision was dropped at the insistence of Senate members of the conference committee which drew up the final version of the bill. But the House conferees declared that "the continued award of these defense research and development contracts to educational institutions which appear to be making a determined effort to either ignore or deter our national defense effort will be given very careful scrutiny," and they directed the Pentagon to be ready to supply details, "including the identity of persons receiving classified information." According to a staff member of the House Armed Services Committee, the new Section 203 will help put teeth into any investigation along such lines.

The House-Senate conferees also watered down strict Senate-approved controls on chemical and biological weapons. In the most important change, the Surgeon General was deprived of veto power over open-air testing and transportation of lethal agents. But Senator Thomas J. McIntyre (D–N.H.), sponsor of the Senate CBW amendment, promised to hold hearings soon on the Pentagon's whole CBW effort, including its observance of new safety provisions (*Science*, 22 August).

—ANDREW HAMILTON

A Washington journalist, Andrew Hamilton will be writing for the news section while Philip M. Boffey is on assignment in Japan.