funds have been allocated to government laboratories. "If university people or private sector groups think there's a lot of money there, they're wrong," Bierly of NSF says bluntly. Carl Sagan, a planetary scientist at Cornell who has labored to publicize the "nuclear winter" hypothesis, says this raises questions about "the degree of independence" of those conducting the research. "I fear that only a small fraction of the funds—10 percent—may be given to independent researchers through NSF, and the rest of the money will be spent by DOE and DOD. If this actually occurs, it would run the risk of appearing as if the government was afraid of an independent assessment." Again, OSTP officials say that it is too soon to say whether DOD and DOE will also make grants to outside scientists.

Finally, some scientists are concerned that the Administration has made no commitment to research beyond next year. May says that "although you can make a very good start at understanding the problem, it is important to have in mind a multiyear program." George Carrier, a professor of applied mathematics at Harvard University who chaired a recent National Academy of Sciences' panel on "nuclear winter," agrees. "You won't get it done in one year, and I'd be surprised if you could do an adequate job in three. You simply just can't quit after one."—**R. Jeffrey Smith**

Carnegie Launches Education Forum

A long-term look at science education policy and the economy is intended to sustain current interest in education issues

How are economies transformed by advancing technology? Some scholars predict that the march of technology will mean fewer jobs a quarter century from now for unskilled laborers but a rising demand for workers with science or mathematics-based education. Others predict the opposite, saying that the workforce of the future will be one in which a small cadre of highly skilled, well-educated people at the top are supported by a vast structure of unskilled workers who barely earn more than minimum wage. A third school of economists foresees the day when machines will do so much of the work that only a small percentage of the adult population will work at all.

"What you think about these schools of thought, and whether you believe any of them, affects what you think about science education," says Marc Tucker, executive director of the new Carnegie Forum on Education and the Economy. With start-up funds of $600,000, the Carnegie Forum has just been launched as a 10-year examination of education policy that "reflects a world transformed by science and technology."

During the past couple of years, there have been a number of prominent reports on the state of science education in the United States, and Congress has responded with controversial legislation that authorized spending more than $2 billion for improved instruction in science and math, although experts doubt that anything approaching that sum will actually be spent (*Science*, 28 September 1984, p. 1453).

The Carnegie Forum is in part a response to the current enthusiasm for science education, an attempt, as David A. Hamburg puts it, "to keep the nation's attention focused on long-term educational improvement." As president of the Carnegie Corporation of New York, Hamburg will head the forum. "Most of the recent reports have, with good reason, linked education to the changing economy. The ability of the advanced industrial countries to compete effectively in the new world economy has increasingly depended on a skilled workforce," Hamburg observes. "We need a reevaluation of the arrangements for education," he states. "More money is surely needed, but we must create new sources of teaching talent, new ways to teach and learn, new curricula."

New York Times News Service

David A. Hamburg

The nation must focus on long-term educational improvement.

One goal of the Carnegie Forum, according to Tucker, will be to foster sustained, original research to blend social science and economic study so that better judgments can be made about the relationship between education and the economy. Another will be to look at more immediate questions, such as the quality of public school teachers and ways to deal with a predicted teacher shortage coming in the face of a minor baby boom.

The idea for the Forum originated 2 years ago when the Carnegie Corporation sponsored a meeting of business, labor, and education leaders, chaired jointly by Hamburg and former North Carolina governor James B. Hunt, whose state is at the forefront of education innovation in the sciences. That meeting convened a "group of 50" men and women who agreed that the needs of the economy are the primary concern driving education policy. The Carnegie Forum will be double that size, with an

annual invitational conference of 100 experts who will be asked "to consider the issues and options linking education policy with future economic needs." The forum will also sponsor workshops.

If you accept the hypothesis that the economy will need a large corps of educated, skilled workers, a prescription for more and better science education should be followed. If, on the other hand, you believe the prediction that only a small cadre of educated adults will find rewarding employment, then the argument that the country should expend substantial new money on science education loses force, at least insofar as economic demand is the justification for such an investment. Following the latter prediction, a heavy investment in science education would have to be justified more in terms of the social rather than economic value of scientifically literate citizenry.

Among the specific questions that the Carnegie Forum already has on its agenda are these:

- What should the United States do to respond to the challenge of international economic competition? What changes in current investments in education are needed?
- Will the national economy require a population with skills higher, lower, or about the same as at present? What basic technological skills will be needed by everyone?
- How does national science policy affect education and the economy? Are the recent initiatives (in Congress, at the National Science Foundation, and elsewhere) to improve science education likely to meet the country's needs?
- How do you improve intellectual skills of elementary and high school students in a way that is efficient and cost-effective?
- What special considerations are there for science education for women and racial and ethnic minorities?

One crucial thing to recognize in considering education policy, according to Carnegie officials, is the fact that agreement is not likely to come easily, if at all, but that "policymaking in education cannot be held in abeyance in the hope that differences of view among experts on the economic issues will be resolved." What will be essential, they argue, is that people be willing to change their minds as new data and policy analyses come along—an optimistic hope.

"There is reason to believe that Americans are poised for changes in education policy that will prove in retrospect more dramatic than they have ever experienced," Hamburg says. "If so, the current wave of attention to education is just the beginning."

—BARBARA J. CULLITON

A Push for European Patent Reform

There is pressure from within Europe and from the United States to permit publication of research results before a patent is applied for

Paris. Pressure is growing on European governments, not only from parts of their own patent communities but also from the United States, to introduce new legislation creating a "grace period" for the protection of scientific discoveries. The goal is to change the current situation under which, unlike in the United States, scientific research results cannot be patented in Europe once they have been published in the open literature.

Many of the examples used to support such a change are being drawn from the field of genetic engineering. The introduction of an international grace period of perhaps 6 months after publication, for example, is the first of a list of recommendations made in a report on patent protection in biotechnology soon to be published by the Organization for Economic Cooperation and Development (OECD) in Paris.

Its proposal is already proving controversial. There is no clear consensus in Europe's industrial community on whether the change is needed, the main pressure tending to come from medium-sized companies and patent attorneys—as well as university patent officers—rather than from large chemical or pharmaceutical manufacturers. Many national patent agencies are reluctant to introduce new rules into a field that is already highly complex and appears to operate moderately efficiently. Officials in other institutions, such as the European Economic Commission in Brussels, argue that if European countries are required to harmonize their practices with those in the United States, then the United States should in return be persuaded to change those aspects of its domestic patent legislation which currently discriminate against foreigners.

The main focus of the current debate is the Geneva-based World Intellectual Property Organization (WIPO). This is the United Nations body responsible for administering a number of international patent treaties, including the Paris convention of 1883, which provides the basic framework for international patent law and now has 94 signatories, including all member countries of the OECD and of the Socialist Bloc.

Largely at the prompting of the United States, but with support from officials from some European countries as well, WIPO has for several years been laying the groundwork for the possible creation of a new international treaty whose signatories would each agree to accept a grace period between the publication of scientific results and the date by which a patent application based on these results must be filed.

Ludwig Baeumer, the director of WIPO's Industrial Property Division, points to the wide discrepancy in current practice among those who have signed the Paris convention. Some, such as the United States and Canada, currently acknowledge grace periods (of 1 and 2 years, respectively); others, including Japan and Australia, have shorter grace periods and subject them to strict conditions, such as only covering publications in journals of learned societies.

In contrast, no grace period is allowed in Europe where any publication is counted as a "prior disclosure" that invalidates a subsequent patent application. Indeed, several European countries—notably West Germany and the United Kingdom—who have accepted grace periods in the past gave them up when they became signatories to the European Patent Convention of 1973.

"The result is that some inventors now lose their rights," says Baeumer. "This is particularly true of inventors who do not know they are inventing something, such as scientists who do not identify their results as inventions but prefer to consider them solely as scientific discoveries."