gist and clinician at the University of Utah medical school, are all members of the National Academy of Sciences. So far, the group of has met once—in early January at a get-acquainted session. It is not yet certain how frequently it will meet or whether its public interest meetings will be open to the public.

The Money

As for the money in this arrangement, $23 million is a tidy sum for Harvard Medical School but, spread over 12 years and being largely tax-deductible as a business expense or charitable contribution, it is probably not such a major amount for the nation's 38th largest company whose annual sales in 1974 were in the neighborhood of $3.5 billion.

For the present, Folkman and Vallee each get a research sum of about $200,000 a year, guaranteed for the 10 years remaining in the contract, but that amount is likely to rise to accommodate inflation as well as anticipated progress. Further, Harvard is getting an undisclosed sum, which *Science* calculates to be at least $12 million, in endowment money, to be used now to support persons affiliated with the Folkman-Vallee research but, ultimately, to be used as general, string-free funds. In addition, Monsanto is equipping laboratories on one floor of a new Harvard building—a $1.4-million proposition. Much of the remainder can be accounted for by the materials Monsanto is supplying for the research. Specifically Monsanto, with its industrial facilities for producing things in quantities no university could manage, is supplying huge amounts of culture media and other biological materials that, presumably, will contribute to the successful purification of the elusive factor.

Some observers, particularly those at other universities, see the Harvard-Monsanto agreement as precedent-setting or in any case they hope it will be. Even the Monsanto press release on the advisory committee raised that possibility when it said, "Committee members have expressed the hope that their activities may eventually serve as a model for others who embark on a similar industrial/academic project in the future." Certainly, the idea of getting a lot of money from industry, a previously underdeveloped source, is appealing to both universities and individual researchers who would love to have the long-term security Monsanto has given Folkman and Vallee. But it is not at all clear that the Harvard-Monsanto relationship is one that can be easily copied.

In establishing a joint program, Monsanto made it clear that it wanted two things: the first, and probably most compelling, is a piece of the action on TAF. Although the agreement is between the company and the university, it focuses most specifically on Folkman and Vallee and includes a provision about what would happen were either of them to leave or die. Harvard must provide some investigator, acceptable to Monsanto, to take over. Otherwise either party could cancel the agreement. Secondly, Monsanto insists that from its Harvard collaboration it is learning a lot about biological research that it might otherwise not know and that this too is important to the company. Surely it is a more certain prospect than any product resulting from TAF, which Monsanto admits is a risky proposition.

It is hard to predict just what effects arrangements of this sort would have on medical schools were they to become common. Obviously, the agreement introduces an element of free enterprise into the system that can fairly be described as different. Questions abound. Would it undermine peer review? Would it lock the university into business deals it ultimately might not like? If one such arrangement is acceptable, would many subtly work against academic freedom in ways no public interest committee could fully guard against?

No one knows, but Harvard, obviously, is willing to take its chances. Counsel Steiner thinks the agreement should be applauded as a step bringing industry and academe together and says frankly, "I'm proud of it." Meadow, who negotiated so long, suspects that the setup may not be reproducible, but, when asked whether he would be willing to try to recreate it were another company to come along, he replied, "You bet."

—BARBARA J. CULLITON

Frank Press, Long-Shot Candidate, May Become Science Adviser

A dark horse whose name was not even mentioned in previous public speculation has emerged as the leading candidate to serve as science adviser to President Jimmy Carter. He is Frank Press, a 52-year-old geophysicist who currently heads the department of earth and planetary sciences at the Massachusetts Institute of Technology (MIT).

Although Press is chiefly known in public policy circles for his work on seismic detection of underground nuclear tests and his strong advocacy of a national program to develop earthquake prediction capabilities, he has had a fairly broad range of advisory experiences at the national and international levels. That background, some say, would make him an effective force in the Carter Administration.

The strong signs that a science adviser would soon be named sent sighs of relief through the science policy community, which has been dismayed at the Carter Administration's slowness in filling the post. The earlier a science adviser is appointed, the better the chance he will have to exert influence over other key scientific appointments in the various agencies and departments and over the Administration's emerging policies on technical issues. Many scientific leaders expressed particular satisfaction in the choice of Press because they believe that he would contribute important strengths to the Carter team, particularly in such areas as arms control, international relations, and earth resources—all items of high-priority interest to the new President.

Press met with Carter at the White House on 9 February for a half-hour conversation about the job. So far as is known, he was the first—and only—scientist to be called in for such an interview. No one else was present, and few details of what transpired have leaked out. Press, who is being circumspect about the whole affair, told *Science* he had "a very agreeable conversation" with the President and "walked out with a very warm feeling," but without a firm job offer. Beyond that, he would not comment. Others close to the situation report that, by the end of the conversation, Carter was impressed enough to ask Press to prepare a paper setting forth his vision of the job. The paper that

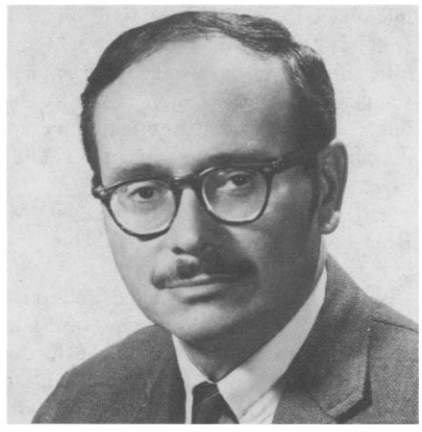
Press subsequently submitted is said to have won initial murmurs of approval from the White House.

At this writing, the White House has not named Press or even acknowledged that he is under consideration (the meeting with Carter was not listed on the official White House appointments schedule). But science policy aficionados are betting that Press will be Carter's choice—perhaps before this issue reaches its subscribers. If an offer comes, Press is ready to accept it. He is said to have agonized for several days over whether to pursue the job, partly because his wife has a career of her own as head of a project in early childhood education for the Cambridge, Massachusetts, school system, far from the Washington, D.C., environs where the science adviser usually lives. But Press ultimately concluded that the job was too important to pass up. "We're trying to sort out our career problems now," he said. "I don't know how we'll resolve it. But if I'm offered the job, I'll take it."

Press's name was thrown into the candidates ring by one or more of the scientific leaders who were asked to submit recommendations for scientific appointments to the Carter transition team or the White House. Unlike some other nominees, he had not been identified as one of Carter's advisers during the campaign. He wrote one position paper for the Carter campaign—on earthquake prediction—but it seems never to have been used. Press's candidacy for science adviser is said to have hovered in the background until the reputed front-runners were either eliminated, or dropped out, at which point the White House focused renewed attention on his qualifications.

Press is said to have received a strong endorsement from Jerome B. Wiesner, president of M.I.T., former science adviser to President John F. Kennedy, and a perennial power in Democratic party science policy circles, who was himself under consideration for the job at one point before withdrawing his name. "He has the kind of experience and background that will make an extremely good science adviser," Wiesner told *Science*. Press may also have been endorsed by Philip Handler, president of the National Academy of Sciences, who calls himself "a fan" of Press's but declines to say whether he communicated his admiration to the Carter folks. And Press has a moderately close friend in the highest ranking scientist of the Carter Administration, Secretary of Defense Harold Brown, a physicist and former president of the California Institute of Technology.

Brown, who is reputed to be Carter's most influential adviser on scientific talent, was not one of those who initially nominated Press for the job. That became clear at swearing-in ceremonies for the Cabinet on 23 January when President Carter, in a moment of bantering, revealed that Brown had recommended five individuals for the science advisory job, "all of them physicists." (Press is a geophysicist.) The President went on to indicate that he would ignore Brown's choices. He said that he would use Brown himself as "my physics adviser" and would "get someone else . . . to help me in the other position." Although Press was not on Brown's original list, his friendship with Brown presumably did him no harm once his name was under active consideration. Press attended graduate school at Columbia with Brown, worked on nuclear test ban issues with him in the early 1960's, and has otherwise crisscrossed his path over the decades. "Harold's a friend of mine," Press says.



Frank Press

The choice of Press was praised by virtually every one of some 15 prominent scientists or science policy specialists contacted by *Science* in a brief telephone survey. The list of admirers included, but was not limited to, John D. Baldeschweiler, Caltech chemist and former deputy science adviser ("a marvelous choice—extremely well qualified and informed"); Harvey Brooks, Harvard applied physicist and public policy professor, who says he was one of a number of people who made sure that Press's name was on the candidate list; Emilio Q. Daddario, director of the Congressional Office of Technology Assessment ("I have a good, healthy regard for this fellow"); Franklin A. Long, Cornell University chemist and public policy specialist ("I think very highly of Frank"); Gordon J. F. MacDonald, Dartmouth geophysicist and former member of the federal Council on Environmental Quality, ("I can't think of a better choice"); Wolfgang K. H. Panofsky, director of the Stanford Linear Accelerator Center and reputedly a nominee for the job himself ("A good choice—I'm enormously pleased"); and H. Guyford Stever, President Ford's science adviser, who was not asked for his opinion by the Carter Administration but who told *Science*, "I think he'd be great." Press was also given high marks by such colleagues at M.I.T. as Walter Rosenblith, the provost; Alexander Rich, a biophysicist and personal friend; and Eugene B. Skolnikoff, director of the Center for International Studies and a former staff member of the White House science office.

The assessments of Press ranged from lavish praise to moderate praise. None of those contacted could think of anything really derogatory to say about Press, although a few expressed mild reservations about some aspects of his preparation for the job. Press was described as very bright, quick, energetic, able to assimilate large quantities of information in a short period of time, scrupulously honest, sound in judgment, personable, low-key in approach, an articulate communicator, and a broad-gauged scientist with interests ranging far beyond narrow, disciplinary confines. Some say that, when he makes up his mind on an issue, he "comes on strong" and inevitably ruffles a few feathers on those who disagree. One observer who had brief contact with Press found him too "stuffy" for her liking. Another found him abrasive and arrogant.

Press is considered an outstanding scientist—probably more gifted at straight scientific work than were many previous science advisers. He won election to the National Academy of Sciences, the badge of professional excellence, at the precocious age of 33, making him one of the youngest ever to gain admission to that august body of science's elder statesmen. His research interests have included work on planetary interiors, the structure of the earth's crust and mantle, regional and submarine geophysics, and a broad array of seismological problems, including earthquake mechanisms. He is perhaps best known professionally as a pioneer in the use of seismic waves to explore subsurface geological structures and, more recently, for pioneering studies in the use of free oscillations and very long waves to explore the deep interior of Earth. He is currently president of the American Geophysical Union.

Press has spent his entire professional career in academe. He taught at Columbia University for several years after earning his doctorate there, then moved to Caltech where he served as professor

of geophysics for a decade. In 1965, he was lured away by M.I.T. to become head of the geology (now earth and planetary sciences) department, with a mandate to drive it to excellence. By most accounts, he succeeded in doing just that, causing a few hard feelings along the way as he elbowed some tenured professors out of the department but generally winning plaudits for invigorating the program. Says M.I.T. President Wiesner: "He took a reasonably good department and very quickly turned it into one of the world's best by the sheer power of his quiet leadership." His administrative experience is considered more than adequate for the demands of running the relatively small Office of Science and Technology Policy which the presidential science adviser heads.

Press has had considerable experience in Washington advisory circles although he could not be ranked as one of the major political figures or "statesmen" of the scientific community. Over the years, he has served as a consultant or adviser to some seven federal departments and agencies, including the National Aeronautics and Space Administration, the Arms Control and Disarmament Agency, the State Department, the Agency for International Development, the U.S. Geological Survey, the Defense Department, and the Navy. He served on the old President's Science Advisory Committee during the Kennedy Administration, but resigned a week after Kennedy was assassinated because "I felt so down I didn't want to continue." More recently, he has served as a member of the National Science Board, the governing body of the National Science Foundation, where, according to one informed observer, he won a reputation as "one of the loudest voices speaking on behalf of basic research," a position that should endear him to those scientists who see the science adviser as their main protector against the budget-cutting onslaughts of benighted political leaders. He is also a member of the Council of the National Academy of Sciences.

Some observers cite this record as evidence that Press has been around Washington long enough to develop a broad array of public policy interests and learn how the system works. But others believe that his experience has been too narrowly focused and too tangential to major government programs to provide an ideal training ground. This was the one major reservation that a few well-informed scientific statesmen had about Press. They viewed him as essentially a "scientist's scientist," an academic who might lack the political savvy to function well in Washington or who might not fully understand how very large applied science agencies in such areas as defense, energy, or health actually function in carrying out their missions. They rated Press less well qualified in this regard than, for example, Lewis M. Branscomb, vice president and chief scientist at IBM Corp., who has had extensive government experience and once headed the National Bureau of Standards. Branscomb was near the top of many nomination lists, but is said to have been ruled out largely because the Carter Administration became sensitive to criticism that it was appointing too many people with IBM connections to top posts.

In one area—earthquake prediction—Press has demonstrated an ability to catalyze government action. He has not personally done major research on the problem, but he has stimulated experiments by others and has campaigned relentlessly for the government to launch a major effort to develop predictive capabilities. His goal is to prepare the country to head off potential disasters in such hazardous areas as that along the San Andreas fault in California. Press argued his case forcefully as a member of a high-level advisory committee during the Ford Administration. According to Stever, Ford's science adviser, Press must be considered a major contributor, perhaps the major contributor, to Ford's decision to more than double the funds for earthquake research in the fiscal year 1978 budget that Ford submitted just before leaving office. Stever believes that episode "augurs well" for Press's ability to stimulate programs during the Carter years.

Useful Experience

Press has had considerable experience in areas that should prove useful to the Carter Administration. His professional training in the earth sciences could make him particularly valuable to a President who has expressed concern over issues involving resources, energy supplies, and the environment. Press, in fact, believes that Carter may have been attracted to him in part because he is an earth scientist—a possibility that is consistent with Carter's pointed remarks that he did not need another "physicist" as an adviser.

Press has also had some experience at the international level. He has served on bilateral panels with scientists from Japan and the Soviet Union, has been an American delegate to a United Nations conference, has visited China in his capacity as chairman of the Committee on Scholarly Communication with the People's Republic of China, and has participated in several meetings of the "Pugwash" group that seeks to bridge differences between the United States and the U.S.S.R. He even has a mountain named after him in Antarctica in tribute to his major contributions to one international research program, the International Geophysical Year, in which he used seismic waves to ascertain the structure of the Antarctic ice cap and underlying terrain. That honor was facilitated, some say, by the fact that the discoverer of the mountain happened to be a friend.

Press has had limited experience on issues involving national security. He is less familiar with military technology than some previous science advisers who worked in weapons development or at military laboratories during the Second World War or its aftermath. The bulk of his experience on military matters was derived from arms control deliberations more than a decade ago. In the years of maneuvering and negotiations that led to the nuclear test ban treaty of 1963, he served as a key technical adviser on the use of seismic waves to distinguish between earthquakes and underground nuclear tests—a matter of crucial importance in preventing surreptitious tests without the necessity of onsite inspection. Although his work was essentially technical, he is remembered as one who favored putting a brake on the arms race and did not view the technical problems as an insuperable barrier to reaching agreements. Press also worked on a broader array of arms control issues during his stint on the President's Science Advisory Committee. Since then he has remained interested in the problem but, although he sits in a hotbed of arms control advocates in the Cambridge area, he has not been notably active in pushing for arms limitations. Some observers believe his previous experience will make him invaluable to Carter in the President's efforts to achieve further arms control agreements with the Soviet Union. Others believe that Press's familiarity with national security matters is too slight to make him an effective voice in an administration where the Secretary of Defense is such an accomplished scientist.

Whether Press gets the science advisory job—and how well he performs if he does get it—will depend in large part on the personal chemistry between Press and President Carter. At this writing, the experimental results are not even in from their first one-on-one encounter.

—PHILIP M. BOFFEY