peatlands as an unutilized wasteland that will actually be improved if the land is drained, mined, and then converted to farm- or timberland or some other purpose. The ecologists, while dubious that the grandiose visions of a future paradise will actually materialize, nevertheless are forced to admit that most people would consider the peatlands a "wasteland" at present. "They're a wasteland in the sense that many fine pieces of desert are wasteland," says Heinselman. "Nobody goes up there but people like me. The land's so soft it's like walking on pillows all day. You walk 100 yards and you have to sit down for 15 minutes to rest. And you can't sit down without getting your butt wet."

"It's a trackless waste," agrees Gorham, who describes himself as "a nut about wetlands, a wetlands freak."

Because it accounts for only about 1.1 percent of the world's fossil fuel resources, according to data presented at a September 1975 symposium of the International Peat Society held in Finland, peat is not considered of major importance in meeting world energy needs. But it can be of considerable local significance. Indeed, it has been burned as a fuel for centuries. The Netherlands, Germany, and Denmark all used peat as fuel on a large scale until exhaustion of peat sources and competition from other fuels led to its abandonment. Currently the Soviet Union is far and away the major user of peat as fuel, burning an estimated 70 million tons in 1975, mostly to produce electricity in 77 power plants. The city of Leningrad, located near several large peatland areas, gets about 17 percent of its energy from peat, while the Soviet Union as a whole gets 2 percent. Ireland is the only other major user of fuel peat, burning an estimated 3.5 million tons this year, accounting for nearly a third of its total energy supply. Finland, which has been hit with an unusually sharp rise in oil prices, has begun to expand its fuel peat production rapidly. Sweden, which abandoned fuel peat in the 1960's, is now planning three peat-fueled heating and electricity power plants. And Greece has plans to use a peat bog for electricity generation. According to information presented to the international symposium, the United States, Canada, Norway, Denmark, and East Germany are not at present using peat as fuel, although Canada has shown interest in producing household peat for home heating. The countries that do use peat as fuel generally burn it directly or in a mixture with other fuels. None is known to be producing gas from peat, as has been proposed by Minnegasco.

The United States has relatively small reserves of peat compared to that of some other countries. The world's peat resources are concentrated in a relatively narrow area of the temperate zone, where the climate has been favorable for peat formation for at least the last few thousand years. The Soviet Union contains about 60 percent of the world's estimated peat deposits (exclusive of Alaska), while Canada and Finland account for perhaps another 20 percent between them and the United States, exclusive of Alaska, has roughly 5 percent. Minnesota is the leading peat state among the lower 48 states, with an estimated 7.5 million acres, covering about one-seventh of the state's total land area. Wisconsin, Michigan, Florida, New York, and Maine also have large reserves. Alaska is believed to have some 50 to 100 million acres of peat but much of it is in frozen, inaccessible regions above the Arctic Circle.

The lead role in assessing the economic, social, and environmental aspects of peatland development in Minnesota will be played by the Department of Natural Resources, which must recommend whether to lease the lands and under what conditions. Even before the Minnegasco proposal surfaced, the department had commissioned the technology assessment by MRI as an aid to developing an overall state policy for the peatlands. One possible result of the study will be a recommendation that the peatlands be used for a variety of purposes. Farnham, for example, has suggested that 40 percent might be devoted to energy production, 30 percent to crops, 20 percent for production of horticultural peat, and the remaining 10 percent preserved in their natural state because they have unique scientific or educational value or serve as scarce habitats for wildlife.

Before the gasification project could proceed, a state agency—probably DNR—would have to prepare a detailed environmental impact statement for review by a high-level council of agency heads and citizens. The final decision on leasing would be made by the State Executive Council, composed of the six highest-ranking elected officials.

State officials insist that they will give careful attention to possible adverse environmental impacts. But environmentalists fear that the state, in its eagerness to head off energy shortages, increase employment opportunities in the north, and rake in tax and royalty revenues from a gasification plant, may jump too quickly at a chance to develop the peat "wastelands," while giving short shrift to the environmental consequences.—PHILIP M. BOFFEY

Bulletin of the Atomic Scientists: Thirty Years of Clockwatching

Chicago. The *Bulletin of the Atomic Scientists* was founded here 30 years ago to warn the world away from impending nuclear catastrophe. While the world has escaped such a holocaust so far, it may be fair to say that the *Bulletin*'s survival is a mark of failure—a failure of scientists to succeed in eradicating the threat of nuclear war.

Bernard T. Feld, an MIT physicist who was recently appointed as the *Bulletin*'s editor in chief, wrote gloomily in the November issue that he had spent "half a lifetime" in arms control and lamented, "Why after almost 30 years of intensive efforts in this direction are we nowhere? Indeed, we are even behind where we started."

But the *Bulletin*'s founders, who were involved in developing the first atomic bombs in the Manhattan Project here at the University of Chicago, keep the faith that science and technology can be used to better the lot of mankind rather than to destroy it.

"I still, I think, term myself an optimist," Feld said in a telephone interview, and said that he agrees, even now, with the words of Eugene Rabinowitch, "The scientists for whom [the *Bulletin*] has been a labor of conviction and love are still anxious and frustrated, but not despairing of ultimate success." Rabinowitch, long the magazine's editor in chief, was the key figure in the *Bulletin*'s history from the first six-page issue on 10 December 1945—when it was little more than a few mimeograph sheets—until his death in 1973.

Although it operates on a shoestring, the *Bulletin* enjoys high prestige among those concerned about science and public policy, and has been described as "an extraordinary magazine" by the St. Louis *Post Dispatch*. It features a half dozen in-depth articles each month, some cautious and scholarly, others hard-hitting and argumentative. (In its November issue, the *Bulletin* scored a coup in publishing the first writing of Andrei D. Sakharov to appear since the Soviet physicist won the Nobel Peace Prize.) Moreover, during the past year, the *Bulletin*'s typography and artwork have improved markedly, making the magazine easier and more pleasurable to read than most analytical journals.

In its business affairs, however, the *Bulletin* has been in the hands of amateurs—people who did not, at least until recently, know the true state of its finances.

But the *Bulletin* seems to have emerged strengthened from the crisis it faced in 1973 and 1974 following the death of editor in chief Rabinowitch and the resignation of the full-time editor, Richard S. Lewis, who apparently had felt that the *Bulletin*'s board of directors wanted the magazine to be too elitist to have wide appeal. At the end of 1973, the *Bulletin*'s circulation was about 14,000, hardly more than half what it was in the late 1960's. In 1974, it was touch and go whether the magazine would be able to pay its printing bills.

At one point, Samuel H. Day, Jr., who became the full-time editor in early 1974, felt such frustration at the unwillingness of some members of his board of directors to initiate a serious fund-raising effort that he offered his resignation. However, an effort to save the *Bulletin* finally began under the leadership of Day and several directors, including chairman Stuart Rice, a University of Chicago chemist. By this fall, thanks to a promotional effort costing tens of thousands of dollars, the number of subscribers was raised to slightly more than 20,000, an increase of more than 40 percent in 2 years. *Scientific American* assisted in this effort by generously allowing the *Bulletin* to use its lists.

Also, the *Bulletin*'s subscribers and patrons rallied to help save the publication. They contributed $50,000 of the *Bulletin*'s $190,000 budget in 1974 and gave another $50,000 in the first nine months of 1975, with some gifts or pledges coming to as much as $10,000. The *Bulletin* is a nonprofit corporation, which means that contributors can deduct their gifts from taxable income.

The *Bulletin*'s trademark is its "doomsday clock" logo, which illustrates

the editors' view of how close the world is to the "midnight" of nuclear war. Earlier this year, Day wrote his readers, "Last fall, the clock came perilously close to striking midnight for the *Bulletin*. It was only with the help of many friends and subscribers, coupled with drastic economies of our own, that we managed to survive that crisis. But all we really gained was a little time."

In his view, the *Bulletin* cannot be continually asking its readers and the general public to come to the rescue. Given the fact that there is no large advertising market for such a magazine, the *Bulletin* must look for salvation in building up its paid circulation and watching its expenses. "It's vital to get the number [of subscribers] up," Day has said. To put its financial house in order, the *Bulletin* in 1975 hired as its full-time publisher James P. Cahill, formerly a vice president of the Westinghouse Learning Corporation. This represented a salary commitment the magazine never had the courage to make in earlier years.

The *Bulletin* does not consider itself a magazine primarily for scientists, but rather a publication for the intelligent citizen interested in the political and social implication of science-related topics.

"I don't think the *Bulletin* is supposed to be an intellecutal magazine. I think it should be a polemical magazine with attention to the long-range implications of the issues it raises," Day said in an interview. He thinks that subscribers demand articles of topical relevance. "You can't sell subscriptions to an essay magazine," he said.

A cordial, earnest, chain-smoking former newspaperman of 49, Day provides the main week-to-week editorial direction from the *Bulletin*'s offices at the University of Chicago.* His punchy monthly editorials add brisk exclamation marks to the sometimes staid copy. The letters section is large and full of vigorous debate, including criticisms of the magazine by John Maddox and Eugene Wigner, among others.

Feld, the *Bulletin*'s new part-time editor in chief, will resume teaching at MIT in January after finishing his 2-year stint as secretary-general of the Pugwash Conferences on Science and Public Affairs. His job is to oversee the magazine's long-range editorial direction; Feld knows the *Bulletin* well from his decade of service as a member of the board of directors.

Day is a thoughtful, thorough editor whose conscience continually impells him into matters of controversy. In his previous position as editor of the now-defunct *Intermountain Observer*, a liberal weekly published in Boise, Idaho, Day was similarly involved in hot disputes, some of which he helped generate by his aggressive reporting of environmental problems and other issues. He sees the magazine getting "more thoroughly into the internal dynamics of some traditional *Bulletin* issues such as the arms race . . . We want to talk about it in terms of the institutional mechanisms that feed into the arms race—the way science in the United States is contributing to military research, and the way universities and scientists are tied into it . . . We want to get into it in a way that names names and goes into institutional politics and relationships between universities and the defense bureaucracy . . . This kind of approach has a few pitfalls. It might hurt some of our own people."

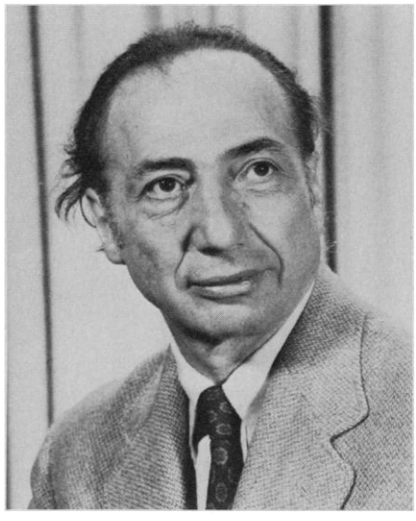
Day gives the impression of being willing to subject his own magazine to the same searching scrutiny. In hours of candid interviews, he emphasized that "everything is on the record." He freely made financial records and internal documents available, even when these were not specifically requested, and invited this reporter to attend the two lengthy Board of Directors meetings held this year, an invitation which was accepted.

The most controversial article the *Bulletin* has printed recently, Day said, was one in the October issue, "The corporate connection," by Charles Schwartz, a physicist and noted scientific activist at the University of California at Berkeley. The article lists scientists who were members of the President's Science Advisory Committee or the National Science Board and who also served as corporate directors or consultants.

The *Bulletin* also received some criticism for an article in the November issue by James W. Prescott, an administrator of the National Institute of Child Health and Human Development, which stated that "deprivation of physical sensory pleasure is the principal root cause of violence." The article features a photograph of a reclining, unclothed mother with her infant—the first nude the *Bulletin* has published.

Feld says the reaction to the recent editorial enlivening of the *Bulletin* has been

*Its address is: *Bulletin of the Atomic Scientists*, 1020-24 East 58th Street, Chicago, Illinois 60637. U.S. subscriptions for this monthly magazine cost $15 for 1 year or $26 for 2 years. In the past 15 months, the *Bulletin*'s subscription price has almost doubled, while the number of subscribers has increased markedly. The *Bulletin* is not available at most newsstands.



Bernard T. Feld

mixed. "There are some people who say, 'Oh, my God, where's the old *Bulletin*?' and other people say, 'It's great; you have these lively articles about sex and violence and that's fun' . . . I think you have to continue to be lively; you can't attract support by being dull and pedantic."

Feld believes that it's a temptation to do exciting, contemporary journalism but that "a number of us have worried about it because the *Bulletin*, in our view, is not intended to be a popular or a public policy version of the *Scientific American*, but rather—in somewhat corny terms—an expression of the conscience of the community. And we have been going back in that direction since Sam Day became editor . . . But still, I think we need to be very firmly based in the scientific community, and represent the people who are actually involved in the new developments and who have enough vision to see where they're leading in the next decade . . . We have to look far enough ahead into the real problems of the world of the next 20 years and not just concentrate on what seems exciting in 1976 and 1977."

Feld, fresh from his intensive Pugwash experience, wants to internationalize the *Bulletin* and "work fairly closely with SIPRI" (The Stockholm International Peace Research Institute). He thinks that it is important for the *Bulletin* to move beyond "the usual classical arms control balance" between the United States and the Soviet Union and to devote itself more to the danger of nuclear proliferation. It is a matter of particular pride to him that "the *Bulletin* was one of the first journals to call attention to the necessity for multinational control of processing plutonium and highly enriched uranium facilities."

Feld also points to the far-seeing series the *Bulletin* published on energy problems in 1971, 2 years before the Arab oil boycott price increase stimulated the rest of the world to think more seriously about energy. *Bulletin* stalwarts also note that the magazine advocated a nuclear test ban treaty as early as 1954 and that it continually called attention to the hazards of radiation during the 1950's.

The *Bulletin* attracted wide attention by printing the first articles by Soviet scientists to be published in this country during the postwar era. It was also instrumental in helping overturn U.S. visa restrictions against foreign scientists.

The *Bulletin* has expanded its editorial interests well beyond its original focus on eliminating all threat of nuclear war. In recent years it has concerned itself also with the environment, alternative energy sources, problems of the less developed world, population, and foreign policy. During Lewis' editorship in the 5 years before 1974, the magazine showed a great interest in space exploration, but this interest now seems to have faded.

Repercussions at the White House

A *Bulletin* article sometimes can have explosive effects. Cornell's Franklin A. Long, a *Bulletin* director for many years, published an article in 1968 questioning the wisdom of antiballistic missile deployment. Later, when this article came to the attention of the White House, it apparently led President Nixon to withdraw his offer to make Long director of the National Science Foundation.

The *Bulletin* is in some ways returning to its founders' primary concern—the need to control the atom. One example of this return is the recent change made in the *Bulletin*'s name. From 1970 to 1974, the magazine reversed its original name by calling itself *Science and Public Affairs*, with "The Bulletin of the Atomic Scientists" reduced to the status of a subtitle. Since Day became editor, the original name—*The Bulletin of the Atomic Scientists: A Magazine of Science and Public Affairs*—has been restored. Throughout the name changes, readers still referred to the *Bulletin* anyway.

Another example of this return to problems of nuclear control is the *Bulletin*'s intensive and highly critical coverage of nuclear reactor safety, including a special issue in September 1975. One nuclear reactor critic, physicist Henry Kendall of MIT, has just been appointed to the board.

The *Bulletin* continues to be published near the very spot where Enrico Fermi effected the first continuous chain reaction of uranium atoms in 1942, the breakthrough that demonstrated the feasibility of an atomic explosion. The *Bulletin* values its academic home at the University of Chicago, and several of its directors are professors at the University. But the *Bulletin* receives no financial support from the university, and, out of a desire not to allow its independence to be questioned, it never has sought such support. One university veteran, U.S. Attorney General Edward H. Levi, told this reporter while Levi was still Chicago's president, "I subscribe to the *Bulletin*, and I'm delighted that it is at the University of Chicago and am eager that it stay." The current university administration continues Levi's intellectual backing.

Samuel H. Day, Jr.

One finds at the *Bulletin* an air of reverence for the dead—for Eugene Rabinowitch and Hyman H. Goldsmith, the magazine's first editors, and for J. Robert Oppenheimer. Leo Szilard, James Franck, and Albert Einstein, the scientists who helped launch the magazine. The *Bulletin* still lists these honored dead as sponsors on its masthead and continues to use Einstein's words that the *Bulletin* "has become widely recognized, in America and abroad, both as the best and most complete source of authorative information on the social aspects of atomic energy, and as a forum for the discussion of the relevant problems, open to all points of view, held in this field by American and foreign, natural and social scientists."

Yet, as the *Bulletin* solidifies its financial and business position and sharpens its editorial eye, it is anything but a mausoleum. Speaking of Day's editorship, Frank von Hippel, a physicist at the Center for Environmental Studies at Princeton, said, "He's really brought the *Bulletin* around. There's been a substantial improvement in the articles." In the past years, von Hippel was dubious of publishing in the *Bulletin* because of low impact there, but he has gladly published a new study on solar tech-

nologies (done with Robert H. Williams) in the November issue.

"I'm excited about what's happening," said director William Swartz. "The *Bulletin* is rolling again. It's like the days of Eugene Rabinowitch."

Even if there is reason to be excited about the magazine's improved quality, the *Bulletin*'s editors think they have more work to do now than in those first frightened months after Hiroshima and Nagasaki. The editorial in the *Bulletin*'s 30th anniversary issue in December argues that "there is the additional problem of increased public insensitivity to the danger which seemed so apparent and so alarming 30 years ago."

The greater "public apathy" about the nuclear danger, the Bulletin continued, "constitutes perhaps the most ominous of the various forces pulling the world toward a nuclear holocaust. The puncturing of that apathy is the unfinished business of the *Bulletin*."—BRYCE NELSON

The author, formerly a writer for the News and Comment section, is Midwest Bureau Chief for the Los Angeles Times. *Nelson lives in the Hyde Park area of Chicago, near the* Bulletin*'s office at the University of Chicago.*

Science and Values Discussed at Moon-Sponsored Parley

Take $400,000, mix well with a list of Nobel laureates and a high-flying idea, and there you have it—the fourth International Conference on the Unity of the Sciences! The conference, held at New York's Waldorf Astoria hotel, featured some 340 scientists and social scientists from around the world, who spent the 3 days after Thanksgiving ventilating their thoughts on science and human values thanks to the largesse of the Reverend Sun Myung Moon, the high-living South Korean evangelist.

The meeting looked to be on the verge of unraveling last summer (*Science*, 19 September), what with the withdrawal of two key participants, sociologist Amitai Etzioni and economist Kenneth Boulding—the former because he felt the conference was unbalanced politically, the latter because he didn't like the Moon philosophy. Elise Boulding wrote in a letter disinviting herself and her husband that she found "elements of demonism and spiritual tyranny" in Moon's religion, which is built around the assumption that he is the Messiah, come to take up where Jesus Christ left off. Several other participants, including Norman Cousins, Buckminster Fuller, and former presidential science adviser Edward David, also defected. But the exodus was stemmed, and the meeting was, by all available indications, a success. It did not, of course, come up with a definitive answer about "the relation of science to a standard of value" (this year's quest) but members of the star-studded assemblage did enjoy a rare opportunity to meet with people from other disciplines and other nations—an opportunity made possible by the fact that the Moon outfit, via one of its many branches, the International Cultural Foundation, was paying everyone's way. The exchange of ideas was greatly facilitated by Moon-paid lodgings, transportation, lunches, and banquets, and the cheerful and efficient help of some 200 young members of Moon's Unification Church. These young people, the men short-haired and necktied, the women in prim dresses and sensible shoes, were ubiquitous, guiding the guests around, taking pictures, pouring water, fetching aspirin, giving tours of the city, and meeting the conferees at the airport armed with photographs for ready identification.

The conference itself was, like Moon's organization, highly structured. The topic, The Centrality of Science and Absolute Values, was divided into four sections: unity of science (chaired by Nobelist Eugene Wigner of Princeton University), the standard of value in society (Marvin Sussman of Case Western Reserve University), the university, research institutions, and human society (Alvin Weinberg of the Institute for Energy Analysis), and the future world order (Morton Kaplan of the University of Chicago). Each section had three committees, each committee two or three dozen members. The committees discussed many things, such as: What values do specific religions support? Are morals the responsibility of the individual or of society? What function should universities serve in underdeveloped countries? and, How can scientific laws, such as Schrödinger's equation (quantum mechanics) be generalized to all the physical sciences? The committee chairmen reported to the sections, and the section chairmen reported to the plenary session, and, not unpredictably, the specifics vaporized into generalities.

Qualms About the Reverend

The conference received little coverage by the press, although note was taken of the fact that a couple of dozen demonstrators tried the first day to cast a damper on the proceedings by calling attention to Moon's cosy association with the government of South Korean president Park Chung Hee and the "brainwashing" techniques that many allege are used by the Moon organization to keep its members in line.

It is probably safe to say that most conferees had only the dimmest idea of who their host was and what he stood for. One scientist at the conference told *Science* that some of the participants felt discomfort at the sponsorship but had not discovered until after they had accepted their invitations who was paying for the adventure.

Most older scientists, particularly those who came to this country to escape Communism, seemed unperturbed by the Moon association. Wigner, a Hungarian, couldn't see anything wrong with it at all, and was quoted in the *New York Times* as arguing that he was willing to go "to conferences sponsored by Communist countries."

Moon, 55, is an avid anti-Communist who founded his church in 1954. He is extremely wealthy, owing to various manufacturing enterprises in South Korea and to vigorous street-vending activities by church members, who number perhaps 25,000.

Moon's star still seems to be on the rise despite the growing criticism attendant on his popularity, and the conferences have no doubt improved his reputation. He, like Maharishi Mahesh Yogi (the transcendental meditation man) has discovered that latching onto science is not a bad way to add legitimacy and prestige to his movement.

Scientists, smitten by gloom and doom over their funding, may be consoled by the fact that our so-called spiritual leaders are looking to them for answers. They also might find it ironic that an interdisciplinary, international conference, the kind of conference dreams are made of, comes to them by way of what most might regard as a highly improbable source.

—C.H.