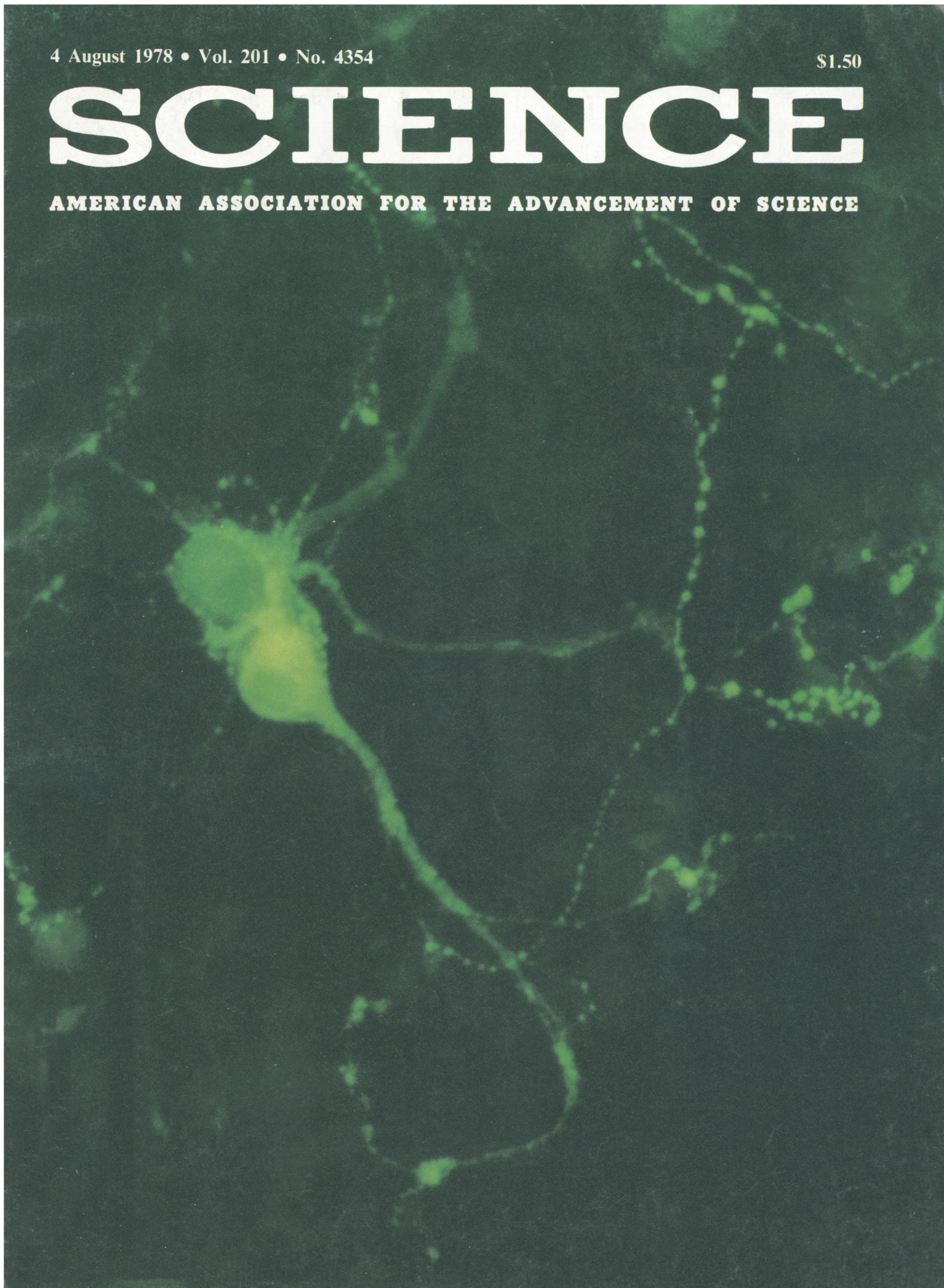


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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



executive health

the report that briefs you on what to watch

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New research findings . . .

ON WALKING . . . nature's own amazing "*anti-age antibiotic*"!

Not running, not jogging, but *walking*
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Today, after some 2000 years, modern medical researchers are demonstrating (somewhat to their surprise) that Hippocrates, "the father of medicine" was right . . . walking is man's best "*medicine*"!

Take one example. At a three-day conference on *Exercise in Aging—Its Role in Prevention of Physical Decline* (held October 27-29, 1977, at the National Institute of Health, Bethesda, Maryland) researchers from across the United States, Canada and Western Europe presented papers on this (until now) largely neglected area of research. As their papers were presented, these important points of agreement emerged:

(1) Walking is the most *efficient* form of exercise . . . and the only one you can safely follow all the years of your life.

(2) Exercise can enable your body to maintain a *vital reserve* which has a protective effect during stress.

(3) Exercised *bones* do not demineralize. As a result they are far less likely to break or lose their range of motion.

(4) Exercised *lungs* still exhibit the emphysema-like changes of age, but are far less diminished in their capacity compared to the lungs of sedentary people.

(5) Exercised *cardiovascular systems* show a similar maximum preservation of function.

(6) The benefits of exercise in preventing or correcting obesity are striking.

(7) Late-onset diabetes is almost entirely reversible by exercise if you are overweight.

(8) Daily exercise permits greater food intake and better blood circulation, thus improving each body cell's nourishment while preventing obesity.

(9) The physically impaired, particularly the arthritic, can perhaps benefit the most from exercise . . .

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COVER

Spinal cord cells grown in dissociated cell culture. The yellow fluorescence throughout the central nerve cell represents endogenous neuronal reactivity to antiserum against enkephalin antibody. The intimate apposition of the "opiate peptide" containing neuronal processes and nonreactive cells suggests the possibility of peptide-mediated communication. See page 467. [Joseph Neale *et al.*, Georgetown University, Washington, D.C.]

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Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

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The Management of Weather Resources

"The history of our time is sprinkled with instances of new technologies running ahead of the social, economic, environmental, international, and institutional thinking that should accompany them. Precisely because the science and technology of weather resources management are still at such an early stage, there is an excellent chance in this field to do things right—that is, for policy to be made and institutions to be built in parallel with the scientific discoveries and technological innovations."

The comment above is part of the reply* by the 17 members of the Weather Modification Advisory Board to the question posed by Congress in the National Weather Modification Policy Act of 1976: in effect, What should the federal government be doing about changing the weather?

What can be done? The euphoric predictions of a generation ago, when cloud seeding was first invented, have not been borne out, but significant results have been obtained. The Advisory Board concludes that a more vigorous and better focused research and development effort can yield regional increases in mountain snowpack in the 1980's, increase the rainfall in areas such as the High Plains and the Midwest by late 1980's, reduce hurricane winds and hail damage by the 1990's, and very soon poke holes in the clouds over cities to let the sun shine through. The changes expected would be 10 to 30 percent increases for snow and rain; 10 to 20 percent reductions for some hurricane winds (with much greater reductions in wind damage); and up to 60 percent reduction for hail in some kinds of storms.

Should it be done? The case for managing local weather is very strong. The economic benefits of delivering more water in the right places—for irrigation, hydroelectric power, and municipal and industrial use—far outweigh the costs. Population growth and migration to sunny coastal areas are multiplying the number of people at risk from hurricanes and other severe storms.

To achieve a better grasp of these problems will take 10 to 20 years of concentrated R & D. At present, physicists cannot follow with assurance the chain of cause and effect through a cloud; we are still too heavily dependent on statistical inference. Yet people in 74 countries with interests at stake have bet good money on operational cloud seeding without the kind of semicertainty that would pass muster in a scientific journal. In the United States last year, clouds were seeded in 88 projects in 23 states, covering 260,000 square miles or 7 percent of our land area.

How should it be done? The air and clouds are a public good, belonging to no one. So we must make sure people intervene with prudence in the great envelope around the globe. The Advisory Board feels that we should resist the temptation to place a heavy regulatory hand on an industry still struggling to be born. But it does propose that the federal government license weather modifiers, just as pilots are federally licensed.

Managing the weather to serve human needs is in itself an environmental impact. Those who experiment in the sky need to go beyond guessing the outcome ahead of time; they should monitor during and assess afterward the ecological changes they may provoke. Deliberate changes in the atmosphere should also be designed in open consultation with the people likely to be affected, not all of whom are Americans.

As things stand, no one is in charge of the future of weather resources management. We are still tackling a 20-year problem with 5-year projects staffed by short-term contracts and funded by 1-year appropriations. It is not nearly good enough. The Advisory Board recommends putting the federal government's weather modification R & D in one consolidated action program (not a "lead agency"), and giving it a clear mandate to produce a kit of useful tools with which to make the best of the only environment we have. If we start now, there is a chance to do things right, for a change.—HARLAN CLEVELAND, *Aspen Institute for Humanistic Studies, Chairman, Weather Modification Advisory Board, Washington, D.C. 20230*

**The Management of Weather Resources*, vol. 1, *Proposals for a National Policy and Program* (Department of Commerce, Washington, D.C., July 1978).

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Following our newly established tradition of the two recent Annual Meetings, AAAS will again have contributed paper sessions at its forthcoming Annual Meeting in Houston (3-8 January 1979). However, because the next Annual Meeting is some 6 weeks earlier in the year than the one just past, we will have less time to prepare for it and therefore we will be unable to schedule slide sessions. The Houston Meeting will have poster sessions only. All abstracts must be submitted according to the instructions given below, not later than 5 September 1978. Abstracts which fail to meet the requirements as

indicated below will be returned. *All contributions must be submitted (and signed) by a AAAS member or fellow* (although this person need not be one of the authors). Contributors will be informed about where and when they will make their presentations in late October 1978. Contributed paper sessions will be of the poster session type only; in such sessions each contributor will have a bulletin board on which to place text and graphic material (of oversized nature) for an extended period of time so that he can discuss his work at length with all interested parties (see *Science*, 28 June 1974, page 1361).

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It is very important to keep your abstract within the limits of a 5-inch (12.7-cm) square. If it is too wide, it will be returned; if it is too long, it may be arbitrarily cut. Note that your original will be our camera-ready copy, so type and letter as neatly as possible.

At the bottom of the page, left side, type the name and address of the person who should be contacted regarding the abstract (that is, the person we should notify of where and when the presentation should be made). On the right side, type the name and affiliation of the AAAS member or fellow who is submitting the abstract and have this person sign the abstract. *The privilege of submitting a contributed-paper abstract for the Annual Meeting is limited to AAAS members or fellows.*

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