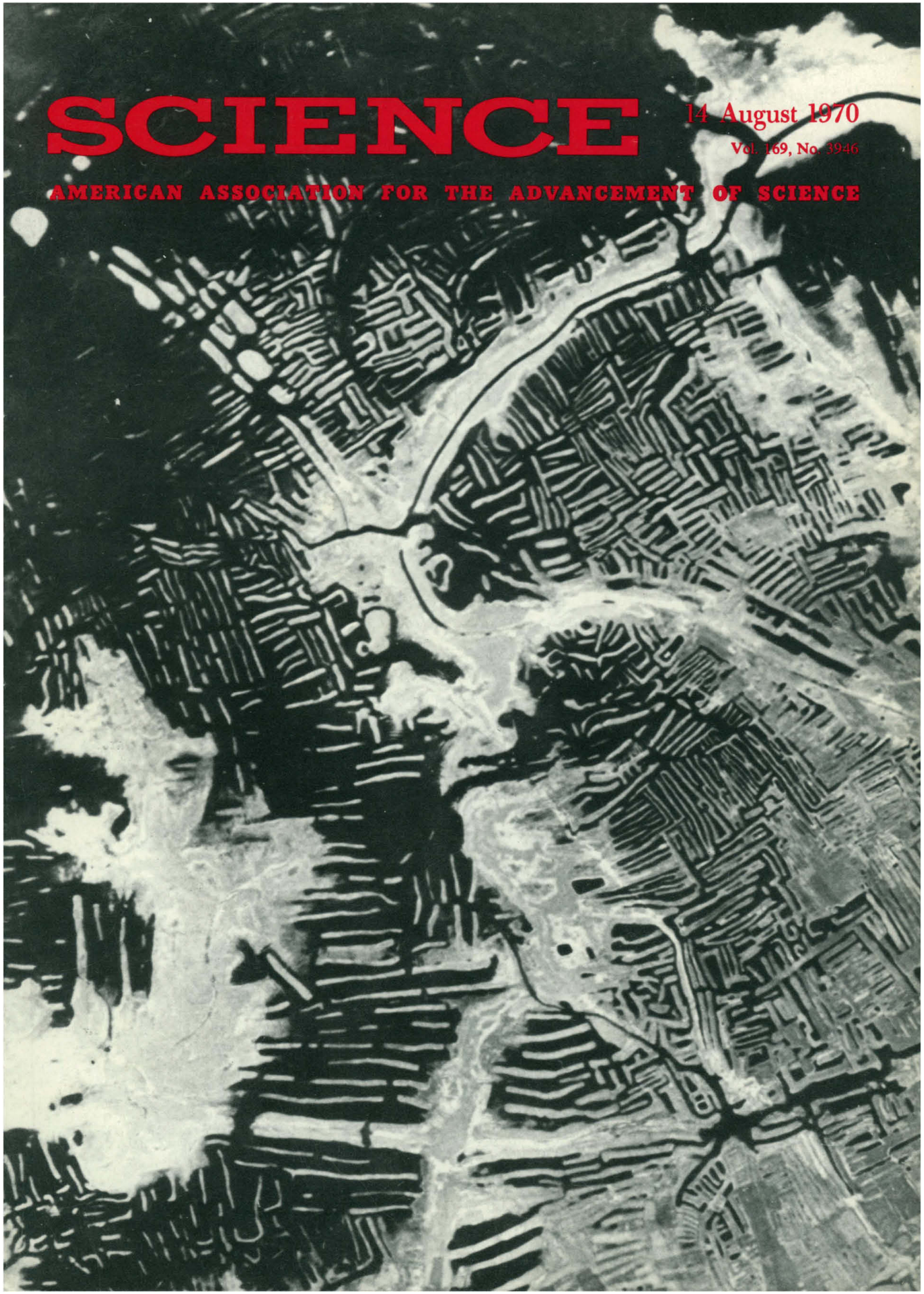
SCIENCE

14 August 1970

Vol. 169, No. 3946

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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To encourage and recognize outstanding writing on the natural sciences and their engineering and technological applications (excluding medicine) in newspapers and general circulation magazines. Three awards of $1000 each for science writing: in newspapers with daily circulation of more than 100,000; in newspapers with daily circulation of less than 100,000 and in general circulation magazines. Contest year. Material must have been published within the United States, October 1, 1969, through September 30, 1970. Deadline date for submitting entries is October 10, 1970. For entry blanks and detailed rules, contact Grayce A. Finger, Dept. W, American Association for the Advancement of Science, 1515 Massachusetts Avenue, N.W., Washington, D.C. 20005.

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SCIENCE is published weekly on Friday and on the fourth Tuesday in September by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C. Annual subscription $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments** and the 30 January issue, which are $3 each. School year subscription: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

COVER

Pre-Columbian ridged fields extending into Lake Titicaca near Requeña, northeast of Juliaca, Peru. Most of the field remnants are 20 to 25 meters wide and 1 to 2 meters high. Similar aboriginal drainage systems have been found in widespread parts of the Americas. See page 647. [Instituto Geografico Militar, Lima, Peru]

Fire Ant: Whose Pest?

In presenting the rationale of the Agricultural Research Service toward pest control ("Agricultural pest control and the environment," 19 June, p. 1419), Irving states that "persistent pesticides should be released into the environment only when necessary—that is, when the need is immediate to protect human health or life-supporting food supplies and when no satisfactory alternative is available." I contend that the logic and good intentions of this statement are violated by the current fire ant eradication program. The ARS and cooperating state agencies plan to treat 120 million acres in nine southeastern states three times with 1¼ pounds of Mirex bait per acre per treatment.

How is this program justified in terms of protecting human health and food supplies? Imported fire ants have seldom been reported to be detrimental in their feeding. Insects, insect products, and other animals form the major portion of the fire ant diet (*1*). Mirex, however, is a very stable and persistent chlorinated hydrocarbon (*2*) and is known to induce tumors in mice (*3*). The Mrak Commission (*3*) has recommended that the exposure of human beings to such carcinogens be minimized and that the use of such compounds be restricted to those purposes for which they are judged to be advantageous to human health which outweigh the potential hazard of carcinogenicity.

If the ARS is really interested in the environment, they should stop this eradication program and recommend individual mound treatments which effectively control fire ants (*1*). Surely we can find a better way to spend $200 million.

DENZEL E. FERGUSON
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References

1. H. B. Green, *The Imported Fire Ant in the Southeastern United States*, Mississippi State Univ., Agricultural Experiment Station Bulletin 737 (1967).
2. C. C. Van Valin, A. K. Andrews, L. L. Eller, *Trans. Amer. Fish. Soc.* **97**, 185 (1968).
3. *Report of the Secretary's Commission on Pesticides and Their Relationship to Environmental Health* (U.S. Government Printing Office, Washington, D.C., 1969).

The imported fire ant is less significant as an agricultural pest than it is as a "people pest." But the people who are affected by it regard the nuisance and the adverse effect upon their health and well-being of sufficient importance to demand relief from it.

As Ferguson knows, the fire ant eradication program is a program of the states in which the federal government is a participant. Federal participation was authorized by Congress in response to demands from the infested states—demands which continue at the local level and through state representatives in Congress. Objections to continuation of the program would have greater weight if they were expressed persuasively to the states concerned. Nevertheless, the federal government does significantly influence the operation of the program. Our 8-year field experience in using Mirex to control the fire ant has included consideration of the possible hazards of the chemical to man and his environment. This experience does not indicate that we should abandon Mirex. Ferguson notes that 1¼ pounds of Mirex bait is applied three times per acre. This 3¾ pounds of bait contains only 5.1 grams of the active chemical and represents an almost unbelievably low amount of toxicant to achieve the high level of effectiveness we have experienced. We believe the continued prudent and systematic use of this tool will eradicate the pest. It will be costly, but it is also costly to live indefinitely with the pest, which is the alternative course suggested by Ferguson.

GEORGE W. IRVING, JR.
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Computers as Chess Partners

The cover of the 10 July *Science* is timeless, but its caption, in the table of contents, is badly dated. The "future" to which it refers, in which "it may be possible to develop computer programs for chess play," began in 1957–58 when Alex Bernstein constructed the first complete chess-playing program for a computer. This and other early programs (including some hand-simulated predecessors) have been published (*1*).

No program yet plays expert, or even Class A, chess, but Greenblatt's program, perhaps the strongest in the field today, has won a Class C American Chess Federation rating on the basis of its performance in tournaments

(against humans). This would place it, I am confident, well above the median strength of *Science*-reading chess players.

HERBERT A. SIMON
5818 Northumberland Street, Pittsburgh, Pennsylvania 15217

Reference

1. A. Newell, J. C. Shaw, H. A. Simon, *IBM J. Res. Develop.* **2**, 320 (October 1958); also reprinted in *Computers and Thought*, E. A. Feigenbaum and J. Feldman, Eds. (McGraw-Hill, New York, 1963), pp. 39–70.

Revising the Publication Process

Contrary to Woodford (Letters, 12 June), Brown *et al.* (*1*) did not propose putting scientific articles on microfilm and providing "hard copies" only on request. Instead we argued specifically against such an idea and proposed a change in the form of journal distribution.

J. F. TRAUB
Computing Science Research Center, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey 07974

Reference

1. W. S. Brown, J. R. Pierce, J. F. Traub, *Science* **158**, 1153 (1967).

Woodford's basic points on "Inflexible page charges" are very well put. However, his remarks that editions of journals in microform or microfiche "remain cumbersome to read or consult" seem to be a personal opinion. Our experience here, confirmed by others in industrial-research laboratories, has demonstrated that editions of primary and secondary journals in the form of 16-mm microfilm in cartridges are easier to use than bound volumes of journals, save readers up to 50 percent of their time as against the use of bound journals (including making copies on microfilm reader-printers), and are popular with researchers who do their own information studies. Some hundreds of libraries have already replaced their bound volumes of *Chemical Abstracts* with the microfilm edition in cartridges, and the number of primary journals becoming available in this format is increasing rapidly. Woodford's experience must have been based on the use of 16-mm microfilm reels not in cartridges. For these, "cumbersome" is a mild term.

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14 August 1970, Volume 169, Number 3946 **SCIENCE**

Science: Attack and Defense

The voices that comment upon science today carry a number of different messages: two of them imply that science (and technology) are virtually omnipotent, but one ascribes to them omnipotence for good, the other omnipotence for evil. The Voice of Expectation says, "With all our much-vaunted science and technology, we ought to be able to feed all the world's hungry, or cure cancer, or (whatever)"; in other words, science may be adequate in content but it is being misapplied. The Voice of Disillusionment says, "It is science and technology that are responsible for all this pollution, or overpopulation, or war, or (whatever); therefore, let us not support them any longer." A third voice, that of Doom-and-Gloom, opposes both of these, saying, "The world is in so desperately bad a state, *no amount* of science or technology can ever prevent the disasters in store for us." There is, alas, a fourth voice. It is not primarily directed against science but against the universities—and thus against intellectual activities in general. What it says is simple enough. It says, "We will destroy you."

How should we defend science against its attackers? To what extent should we change direction so as to work more specifically on the applications of science to the public good? Should we as scientists throw our support behind one or other of the major social and political forces, or indeed behind some other political force?

Of course, it may well be misleading to extrapolate present trends into the future; the voices may die down or be extinguished by technological victories. But if they should continue and strengthen, some argue that we may eventually be faced with a choice between plunging into political activity or withdrawing from the world like the monks of the Dark Ages, to keep the candle of science burning until a serener day dawns. But the second alternative is not a real one, for modern science cannot be pursued in a cell like ancient learning, and very few monasteries are equipped with oscilloscopes and centrifuges.

The first alternative is not a real one either, and this gives us the answer to the questions above. The reasons are obvious and they are twofold, one practical and the other theoretical. The first is that there are only 24 hours in a day and there is only so much energy in each of us; what we divert into political action we take away from science. The second is that, as soon as a scientist becomes a special pleader, he loses his status as an objective judge of evidence, so that his opinion has precisely the same worth as that of any other citizen; each one grinds his own particular ax, and everyone knows it. The politicization of science, like the politicization of the universities for which the radicals clamor, is the road to its destruction. If we were to fall for this, the fourth voice would have achieved victory from within.

No, the only effective defense of science is through strengthening science itself. Our devotion to our research and teaching, our determination not to let them be interfered with, our instruction of laymen and of nonscience students so that the future businessmen and lawyers really understand something of science, our continued and lively awareness of useful and humane applications, our careful and responsible use of funds—these will maintain respect for science and scientists. Then we could say with Brutus,

> "There is no terror, Cassius, in your threats,
> For I am arm'd so strong in honesty,
> That they pass me by as the idle wind."

—KENNETH V. THIMANN, *University of California, Santa Cruz*

Suggested Reading on the

Environment

Estuaries

The development of coastal areas has been very rapid in recent years, but knowledge of estuarine environments has not kept pace with the necessity to resolve problems arising from their intensive use. This is the first comprehensive collection of scientific papers covering the comparatively new field of estuarine research.

This volume contains 71 articles on physical and biological factors, geomorphology, sediments and sedimentation, microbiota, ecology, evolution, fisheries, human influences and pollution.

Edited by George H. Lauff. 1967. 2nd printing, 1968. 776 pages. Illustrated. Bibliography. Indexes.

Agriculture and the Quality of Our Environment

This symposium is basically concerned with the problem of how environmental quality affects agriculture, and how agriculture affects the quality of the environment. It identifies the part which science must play in solving environmental pollution problems.

Edited by N. C. Brady. 1967. 476 pages. Bibliography. Author and subject indexes.

Air Conservation

This is a report of deliberations of the Air Conservation Commission of the AAAS over a 2-year period. It pulls together into a single reference a wealth of information presented by authorities in the fields of conservation, pollution control, pollutants and their effects, law, economics, meteorology, public health, public opinion and government.

The *Bulletin* of the American Meteorological Society calls this work "the most thoughtful, realistic and penetrating analysis of air pollution as a factor in the societies of today and tomorrow now available. It is a *must* for the serious student and professional, and can be highly recommended to the interested citizen."

Report of the AAAS Air Conservation Commission; James P. Dixon, Chairman. 1965. 2nd printing, 1968. 348 pages. Illustrated. Bibliography. Index.

Oceanography

A collection of 30 papers presented at the first International Oceanographic Congress by world-renowned authorities. An interdisciplinary reference that deals with some of mankind's most profound questions . . . the origin and history of living things, for example, and the history of our galaxy as recorded in marine sediments.

Edited by Mary Sears. 1961. 5th printing, 1969. 665 pages. 146 illustrations. Bibliography. Subject index. Author index.

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