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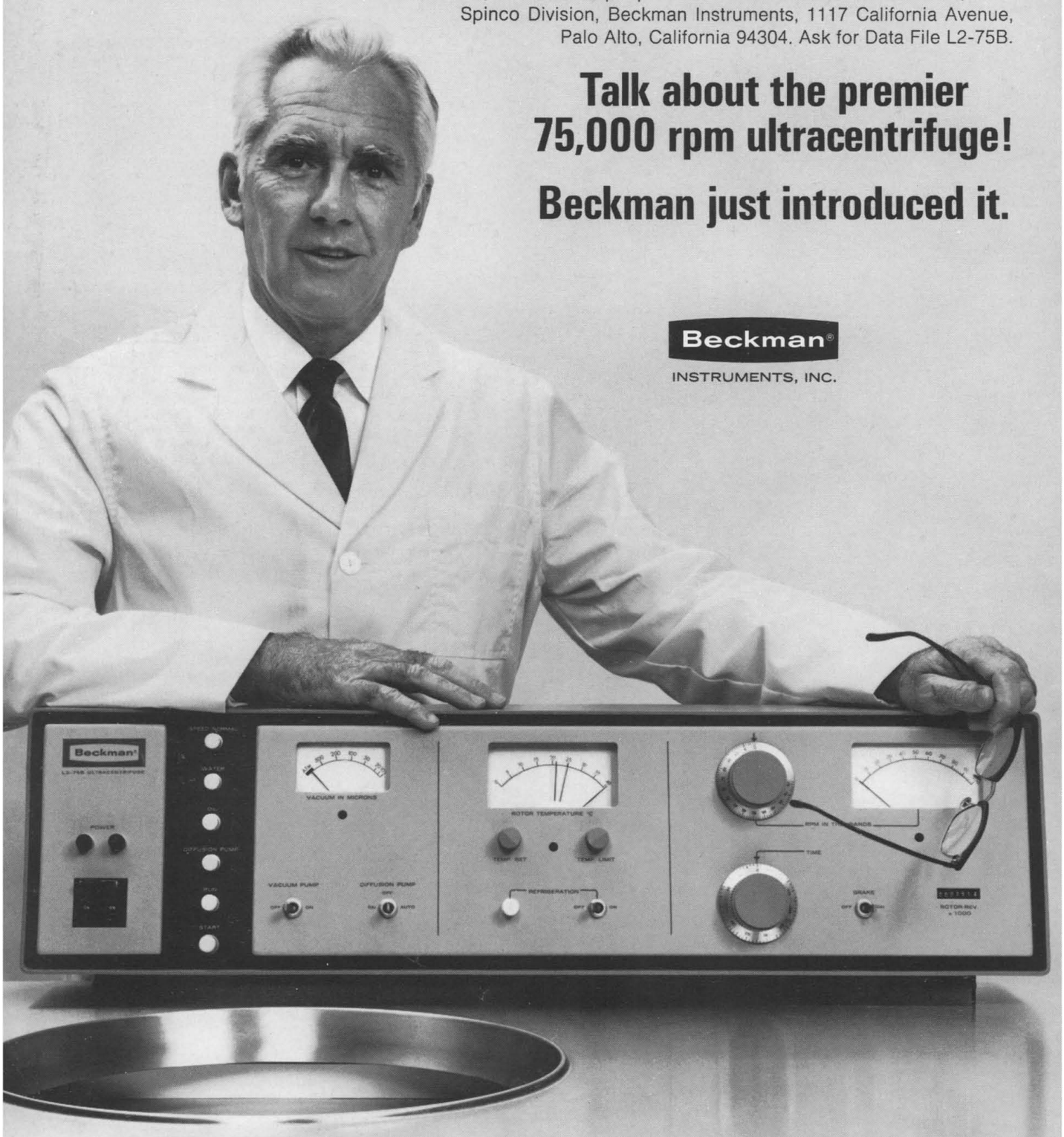

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COVER

Fire control of chaparral in Southern California suggests an alternative treatment to the present Forest Service fuel break program. Chaparral, growing on certain soils, becomes stubbornly water repellent, inhibits infiltration, and increases erosion. See letter by M. Dodge, page 420. [U.S. Forest Service]

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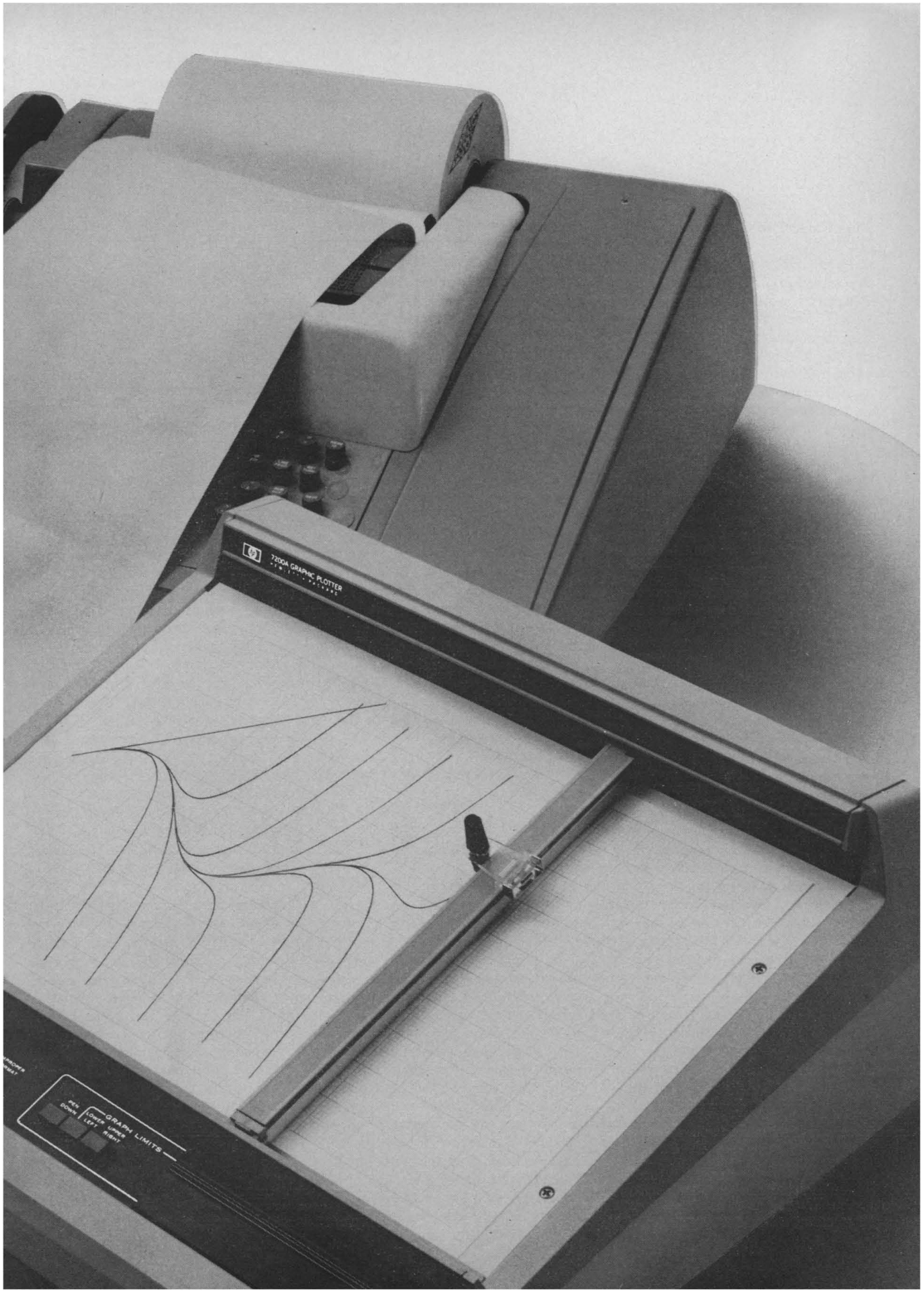
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development of any character and indeed an adverse uterine environment may be a factor in the expression of some cases of schizophrenia.

LEONARD L. HESTON
Department of Psychiatry,
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1. F. J. Kallmann, *The Genetics of Schizophrenia* (Augustin, New York, 1938).
2. J. A. Böök, *Acta Genet.* 4, 1 (1953).

Thermal Pollution Control

In the records of the hearings conducted by the several congressional committees concerned with, or touching upon, thermal pollution, virtually all testimony appears to be based upon three premises: (i) the future electric load in the United States *must* be as large as predicted; (ii) this load must be met by steam power stations basically similar to those in use today; and (iii) when thermal effects are more than can be tolerated, cooling towers are the only practicable solution.

There seem to be non sequiturs involved. A more logical and positive approach would be to concentrate upon the elimination of energy waste. My own work has convinced me that (i) the magnitude of the predicted load can be reduced appreciably without diminution in the level of service simply by improving the efficiency of power-consuming equipment including motors, lamps, compressors, and so forth; (ii) the efficiency of future power stations can be raised to the 50 percent level by means of new power cycles. An example is the closed cycle gas turbine which appears to be gaining acceptance in Europe; (iii) beneficial uses can be found for much of the heat from central power stations now being rejected to rivers and lakes.

These measures for reducing energy waste will reduce thermal pollution and at the same time will conserve our nation's fuel resources and reduce air pollution.

To achieve these results, two things are necessary. First, an adequate amount of money must be made available for research and development work by the federal government. The Federal Water Pollution Control Administration has been given prime responsibility for research on thermal pollution control but funding is only at the rate of $500,000 per year. This is woefully inadequate. Second, the economics of power generation must be modified so that the utilities and industrial, commercial, and residential consumers all have an incentive to use equipment of higher efficiency.

The government should inaugurate an energy conservation program. As a first step, appropriate federal legislation should be enacted requiring: (i) a new federal tax on coal, oil, gas, and nuclear fuels raising the sales price so that more efficient designs will be favored. The tax revenues thus realized can be used to fund government research on control of thermal and air pollution; (ii) acceptance by the federal government of any unusual financial risks which a utility company encounters in building the first of any new type of power station promising higher efficiency and less thermal pollution; and (iii) mandatory labeling of electric appliances by the manufacturer so that the consumer may be aware of the power consumption at the time of purchase.

The regulatory agencies of the individual states can help by requiring each utility to invest a small percentage (say 2 percent) of its total revenues in research and development, and by permitting those utilities generating power most efficiently to enjoy significantly higher profits.

Professional societies and trade journals can help by publicizing the need for more efficient designs of power stations and power-consuming equipment. Perhaps they should follow the lead of the Swedish Association of Engineers and Architects which (with the support of Swedish power producers) is sponsoring a $15,000 contest for the best solution of what to do with the excess heat generated in nuclear reactors.

Finally, the utilities should recognize that their responsibility for developing more efficient power stations is not discharged simply by ordering a new steam turbine of slightly higher pressure or more gargantuan dimensions. It is true that the industry has adopted some new concepts in recent years, namely, nuclear power and combustion gas turbines. The former, however, was pioneered by the Atomic Energy Commission and the Navy, and the latter by the British and the Swiss. Surely the time has come for the American utilities industry and its suppliers to take the lead in finding more efficient ways to greater electric power.

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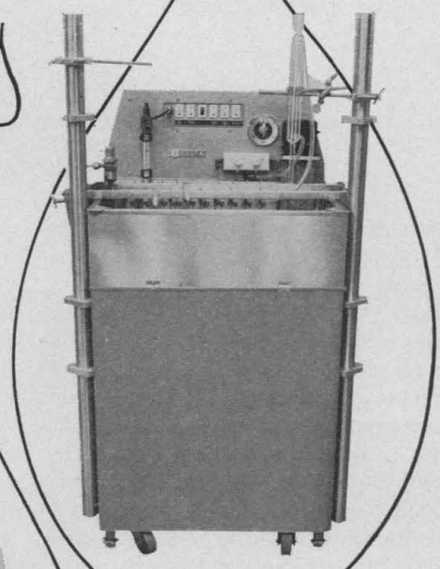

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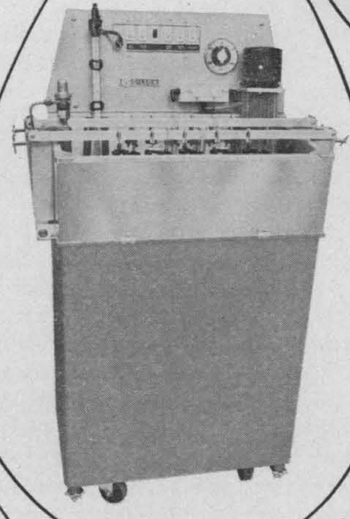

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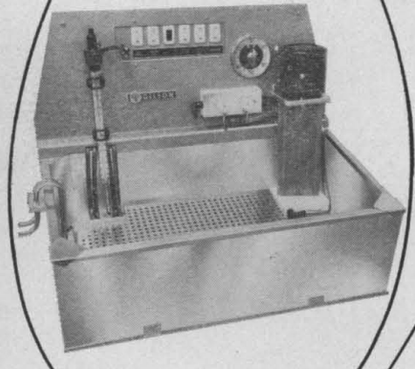

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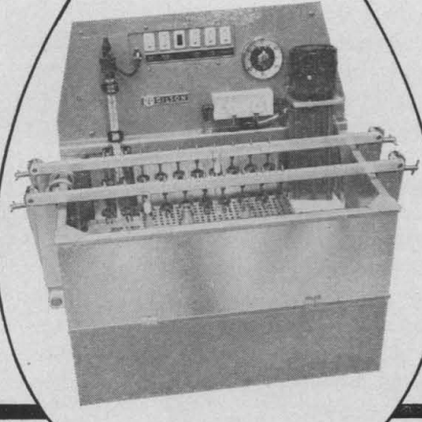

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The Threat of Impatience

A fundamental threat to the survival of the university is impatience. While destructiveness is limited to a very small number, and while romantic visions of the university as a misty community without form or authority are confined to a minority, impatience is pervasive.

One target of impatience is inaction. Its stimulus is the daily intimacy with the horrors of war, poverty, violence, and oppression—all brought into the parlor on the television screen.

Another target of impatience is complexity. Hate and love seem so simple, so obvious and direct. Yet the structures of a technological society and its government seem hopelessly complicated, beyond the reach of most, seemingly unmanageable even to the few who do grasp the levers of power.

A third target of impatience is doubt. With a world to be saved, or simply a life to be lived, there is an overpowering urge to insulate yourself from the nagging, nibbling doubts which seem to spoil every confident hope and tarnish even the most ecstatic dream. Dogmatic assertion is a great relief. To some, blind fanaticism is "beautiful."

Patience, we urge, but patience without purpose is boredom. So "relevance" becomes the slogan of an impatient generation. Their plea is for release from the tedium of learning without purpose.

Better they should cry "significance," for the crisis of purpose transcends topical problems. Today's problem could be "solved," and still the vacuum of purpose would sap the patience which learning requires.

I do think we should be more forthcoming in our admission of the weaknesses and contradictions in our university inheritance. We should recognize and admit that the university is not for all people, nor for most people at all times of their lives. It is not even the only or, for many, even the best circumstance for learning. Action, too, has its claim as a teacher of wisdom. Capacity can be extended and enlarged by doing as well as by thinking.

We should recognize also that, as knowledge does become more relevant to operational decisions, universities do have an increasing professional and clinical function, for the potential operator as well as for the scholar. The applications of learning once associated primarily with law and medicine and engineering must spawn analogous applied sciences in social and environmental studies.

Most of all, we should admit that not all scholarship and learning are equally significant. The quality of intellectual excitement depends on whether the scholar is truly opening a new perspective or is simply accumulating data which do not themselves contribute to understanding. Definitiveness should not excuse the want of significance.

We must even admit that reason is not the only clue to truth. Intuition and creative imagination have their role in perception as well as in expression, in learning as well as in life. Not all that is perceived can be analyzed, let alone weighed or measured. Not all that is worth expressing can be "programmed." Not all that is "true" can be proved by objective evidence.

We should admit all this. We should leave room for—we should positively encourage—intuition, imagination, and the affirmation of revealed truth, even within the academy. We can acknowledge all these things, but we must continue to assert that impetuous action, conscious oversimplification, refusal to doubt, and the rejection of reason are enemies of the university.

—KINGMAN BREWSTER, JR., *President, Yale University*

This editorial is adapted from the Sigma Xi–Phi Beta Kappa Lecture, "If not reason, what?," delivered 29 December 1969 at the Boston meeting of the AAAS and reproduced in the March–April 1970 issue of *American Scientist*.

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