SCIENCE

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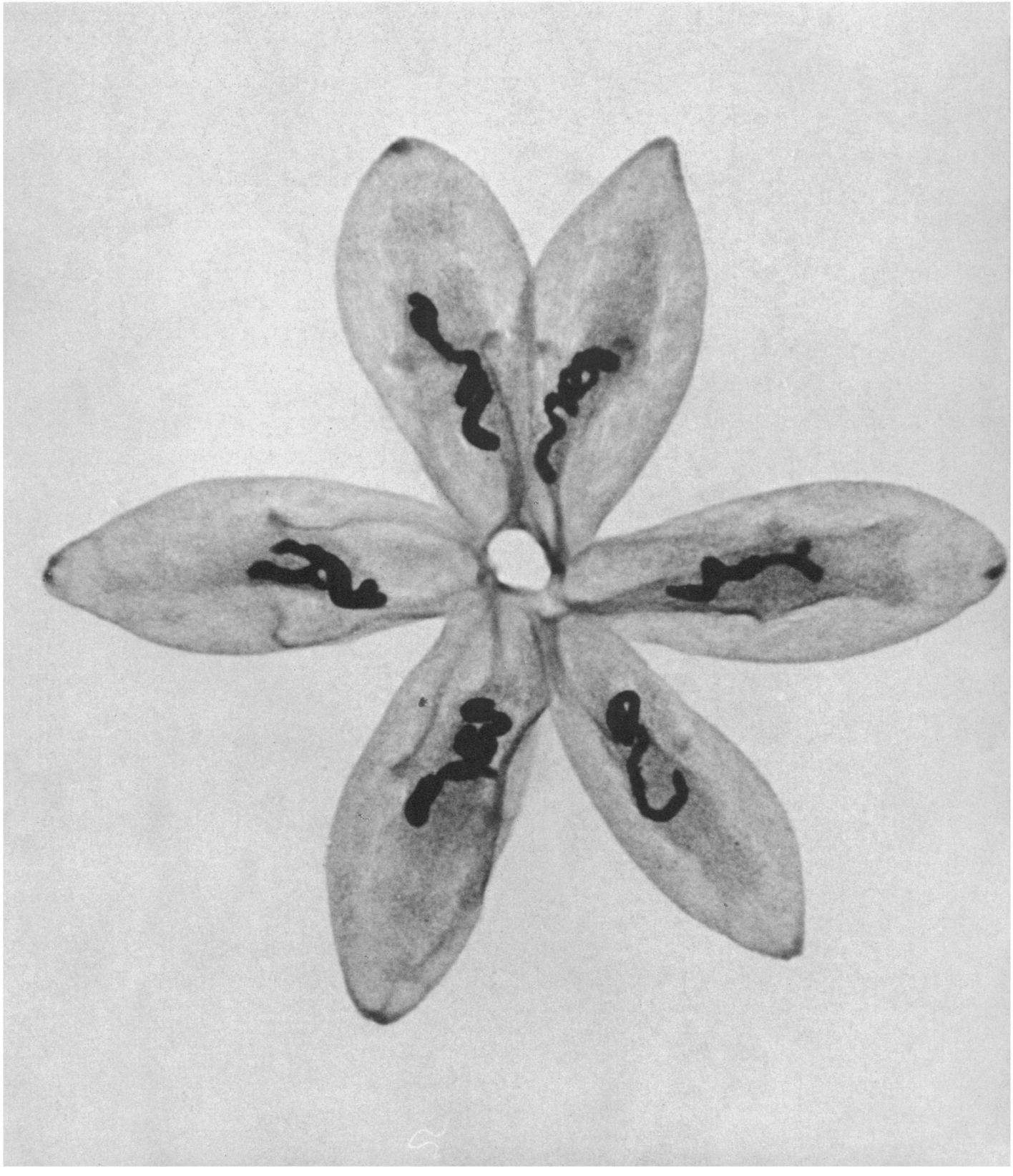


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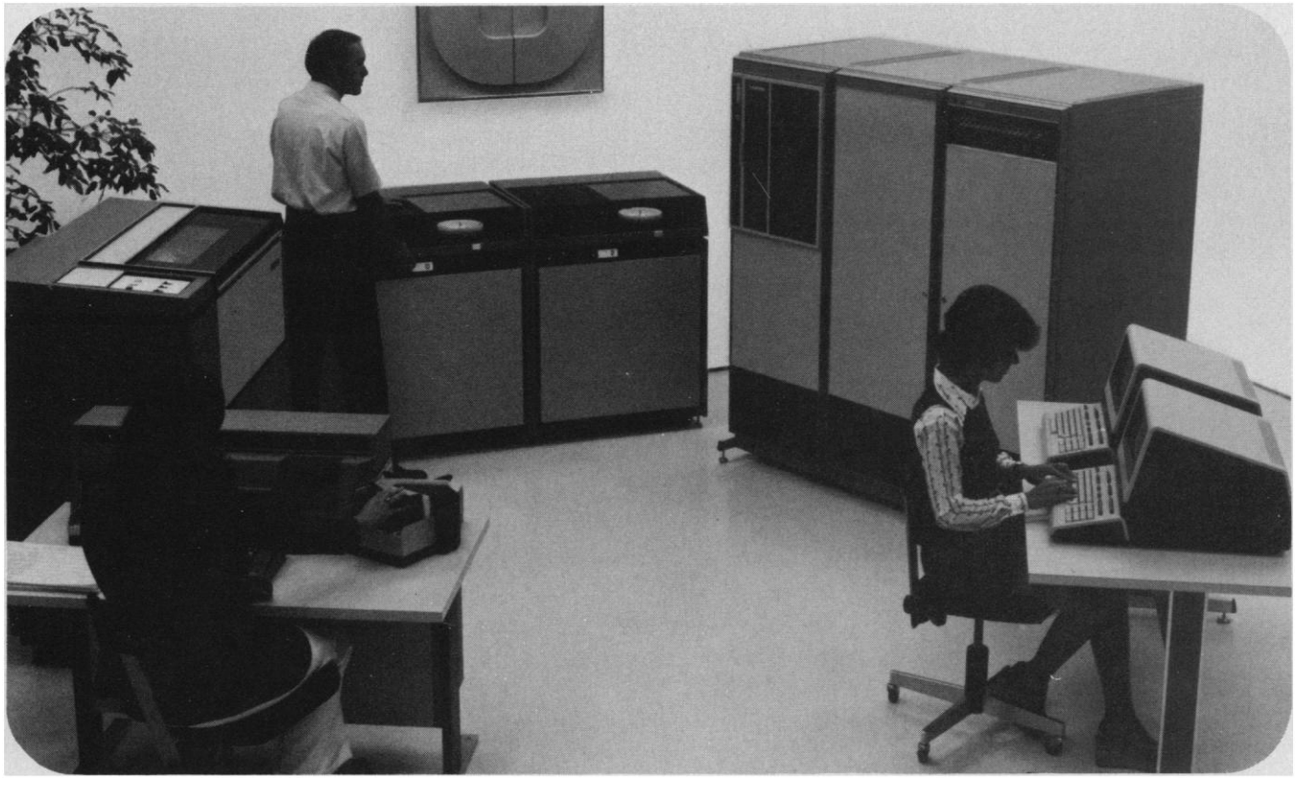
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

COVER

Multicellular complex of unicellular ciliate *Blepharisma intermedium*. Cells of doublet, a morphological mutant, unite side by side forming a chain if treated by the gamone of the other mating type. The chain may close, producing a flower-like formation. Such complexes are used to investigate the meiosis-initiating factor (about × 389). See page 53. [A. Miyake, Max-Planck-Institut für Molekulare Genetik, Berlin-Dahlem, Germany]



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Data base management lets all users store initial values and intermediate results in multiple data bases; generate conclusions from a terminal simply by entering logical expressions and ranges of values; and complete a search for related data in moments rather than days.

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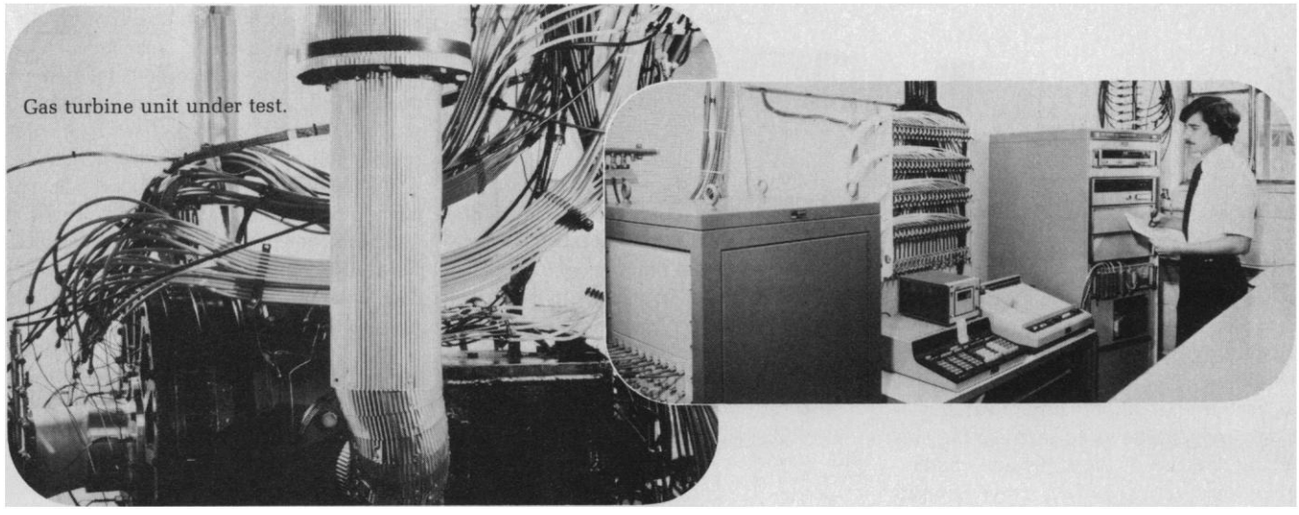
Through a Real-Time Programmable Controller, users can develop and execute data acquisition and priority-scheduled programs from their terminals, and transfer data between several HP data acquisition systems linked in a distributed system. A 2780/3780 Emulation Subsystem links Mini DataCenters to large EDP systems for access to centralized data as needed, leaving the full multilingual productivity of the 3000 systems available to respond immediately to the needs of the laboratory.

The 3000CX Mini DataCenter allows scientists to access, analyze, and report information, interactively from their own terminals, on their own terms. Full capability configurations start at $99,500*.



Gas turbine unit under test.

Calculator-based system speeds Chrysler's data acquisition.

At Chrysler, gas turbine research and development relies on an HP data acquisition system for improved data collection, computer-compatible format, and on-line data analysis.

One facet of Chrysler Corporation's pollution abatement research is the development of a gas turbine engine. Testing such an engine is complex: A single dynamometer test of turbine performance requires as many as 18,000 individual measurements of temperature, pressure, and running clearance at 300 points in the engine.

Under the circumstances, standard data collection techniques were taking too many men too long. Chrysler's research engineers decided to speed the pace of development, and chose a Hewlett-Packard 3050 Automatic Data Acquisition System as the most cost-effective solution to the problem.

The system, controlled by an HP 9820A programmable calculator, permits each dynamometer test to be completed by a single technician rather than two, and within three days instead of 12 or 13—despite the fact that the system handles the output of two dynamometer test cells simultaneously, and acquires about 40 percent more data from each cell than was acquired manually. An additional week's delay previously experienced at the computer center while test data were laboriously keypunched for computer analysis is now reduced to less than a day, because the HP system automatically punches the test data on paper tape in computer-compatible format.

As important as these improvements are, Chrysler engineers appreciate even more the HP system's capability to perform on-line data analysis. The system converts the raw transducer outputs into meaningful engineering units, provides continuous compensation for the thermocouple measurements, recalibrates the pressure transducers twice daily, and monitors test limits. Most importantly, it calculates engine work *vs* efficiency or slip factors and plots the results on-line. With this kind of information available *while the test is going on*, Chrysler engineers can adjust procedures as needed to ensure the validity of results.

The versatility of calculator-based systems can be further enhanced by the Hewlett-Packard Interface Bus (HP-IB), a standard interface system that allows interconnected system components to communicate effectively in an orderly and unambiguous manner.

Price for the HP calculator-based automatic data acquisition system starts at $14,100*.

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Scientists and engineers, as well as lawyers, must be more willing to undertake cooperative pursuits as society's reliance on technology continues to increase. Readers who might desire a more legalistic discussion of technical experts in products liability cases are referred to the original authors' companion article (*1*) in the legal literature.

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References

1. W. A. Donaher, H. R. Piehler, A. D. Twerski, A. S. Weinstein, *Texas Law Rev.* **52**, 1303 (1974).

As Thomas has indicated, environmental litigation differs from products cases in that the former can sometimes be initiated by scientists and engineers. However, we feel that the technologist's role must be coextensive with that of counsel in both environmental and products litigation once it has been initiated. It is also worth noting that the issue of the placement of a gas tank in an automobile has no less societal significance than the determination of the appropriate emission standard for that same vehicle.

Thomas is unfortunately also correct in his observation that, currently, the focus in individual products cases is often exclusively directed toward narrow engineering points. We have tried to point out, however, that even these technical questions cannot be resolved appropriately if they are not viewed by the expert in terms of their broader societal consequences in addition to their technical detail. An expert must realize that he can characterize a product as defective only after he has balanced risks and utility on the basis of societal as well as technical standards. The litigation of products cases must involve societal considerations at the trial level; otherwise the societal significance of the legal doctrine will be meaningless.

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Absence of U.S. Energy Leadership

The United States continues to drift toward some form of drastic unpleasantness. Consumption of gasoline exceeds that of a year ago. Domestic reserves and production of oil and natural gas are steadily declining. Total U.S. inventories of oil and its products are below those of a year ago. Efforts aimed at liquefaction or gasification of coal move slowly. Estimates of costs for full-scale plants climb rapidly. After 5 months, Congress is unable to act. In contrast, the Organization of Petroleum Exporting Countries (OPEC) adjusts supply to demand and prepares for a large price increase.

In their actions and statements during the past 2 years, the leaders of OPEC have proved themselves to be highly intelligent. An example is the Shah of Iran. He has demonstrated more competence to guide his country's policies with respect to energy than has any leader of the Western world. The Shah understands that the oil reserves of Iran are limited, and he is determined to obtain for them all that can be had. He defends his actions well. Thus, the Shah has stated that in 1947 the posted price of oil in the Persian Gulf was $2.17 per barrel and that in 1959 the oil companies lowered the price to $1.79, where it remained until 1973. During those 26 years, the prices of most other goods and commodities increased markedly. The Shah has emphasized, and rightly, that oil is too precious to be used as a fuel. He has pointed out that the world's "petroleum reserves would be depleted in 30 years if we continued to exploit this vital substance. . . . To avoid their precipitate exhaustion, other sources of energy, especially nuclear fission or coal . . . must be substituted for oil and natural gas." He also has pointed to the desirability of harnessing other sources of energy such as solar radiation.

The Shah takes the realistic position that the price of oil should be set at a level equivalent to the costs of producing oil substitutes, such as liquids from coal. (The numbers now being bandied about in the United States run from $15 to $25 per barrel.) Thus the Shah has established a rationale for doubling the price of petroleum. Moreover, he has staked out a position as a farsighted international leader, and history may so regard him.

In moves with respect to prices for oil, OPEC has been astute. Following the quadrupling of prices in 1973–1974, the level was held relatively unchanged while it became clear that worldwide economic disaster was not going to occur. Trial balloons have now been launched to test reactions to a 30 to 40 percent increase in October at the beginning of the period of maximum demand. Reaction has been muted. It seems clear the OPEC could easily get by with a price boost of 35 percent and with further steps later.

But unpleasant as a sharp increase in oil prices might be, it is not the worst hazard. With its depleted resources of hydrocarbons the United States is considerably more vulnerable to an oil embargo today than it was in 1973. At that time Arab production of oil was cut only 25 percent. The Arabs have now accumulated large monetary reserves, and some could easily forego all revenues for an extended period. In the face of a weakening position there has been no U.S. program to provide reserves.

Perhaps the most discouraging feature of the present scene is a failure of U.S. leadership. President Ford's program is limited and not imaginative, but at least he tries. The performance of Congress has been awful. Congress found itself unable to stomach the prospect of even a small increase in gasoline taxes designed to cut consumption. Such revenues would stay in the United States and be returned to the public. Instead, we are destined to pay much higher taxes, but they will be collected by the Shah and his colleagues.

The excuse for Congress is that the public is not educated—not ready for meaningful measures. Perhaps that is correct. However, the public is not rushing to buy gas guzzlers. Somebody knows something.

But failure of leadership is not confined to the politicians. What have intellectuals done? What have the universities contributed? Perhaps the worst failure has been that of the mass media. Supposedly one of their major functions is to inform accurately. The behavior of Congress testifies to their performance.

—PHILIP H. ABELSON