

17 SEPTEMBER 1982 · VOL. 217 · NO. 4565

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SCIENCE



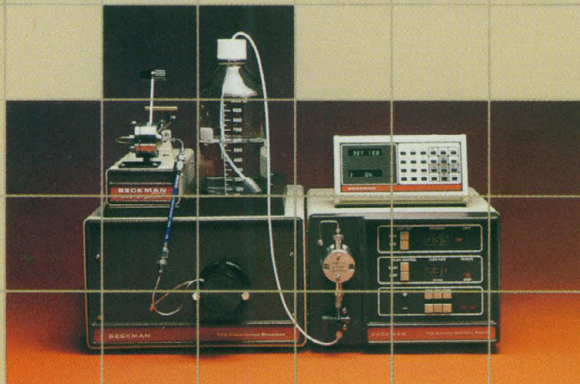
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*Cut sample run time
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Cut solvent use
as much as 80%
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can do both!*

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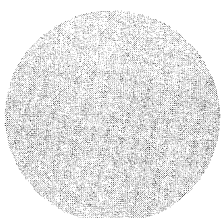
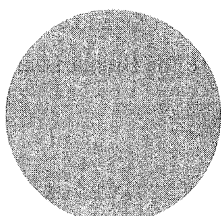
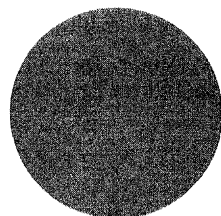
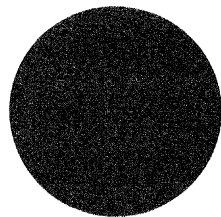
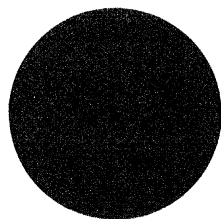
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COVER

Solution sculpture in the Redwall limestone of the Grand Canyon, Arizona. Changes in ground water flow have produced many dry caves in this substrate which are excellent for the preservation of organic Pleistocene fossils such as packrat middens. Twenty-six of 53 fossil middens from the eastern Grand Canyon were collected from caves in this substrate. See page 1142. [Kenneth Cole, Department of Geosciences, University of Arizona, Tucson 85721]



WATCHING THE RED TIDE COULD CURE JET LAG.

In one way, you resemble the small organism that causes red tide.

You both have a biological clock that goes through a complete cycle every twenty-four hours. And it is this clock that causes jet lag.

The difference between you and red tide is that it's a lot easier to watch the red tide's biological clock.



Every twenty-four hours, it glows. Which makes it an ideal subject for finding out what makes the body clock tick. You pop some red tide in a test tube. Do something to it. And see if what you've done changes the time when it glows.

Simple enough in concept.

Not so simple to execute.

In fact, it was taking researchers at Harvard University's Biological

Laboratories days to analyze a single run of a single experiment with a single test tube of red tide. (Among other problems, the chart recorder printout stretched out for fifty feet.)

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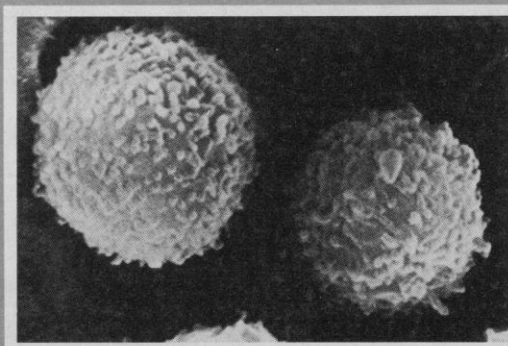
You may discover that computer-based researchers can now concentrate on research. Instead

of computers.

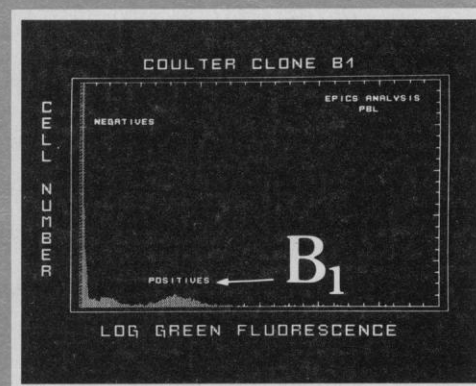
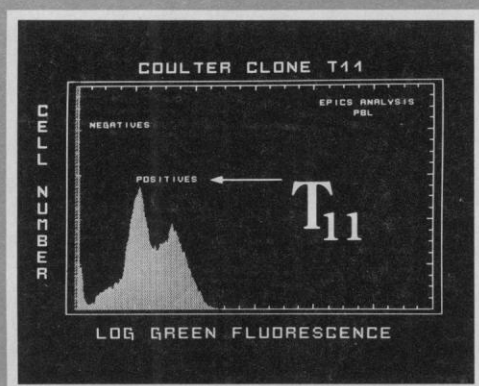


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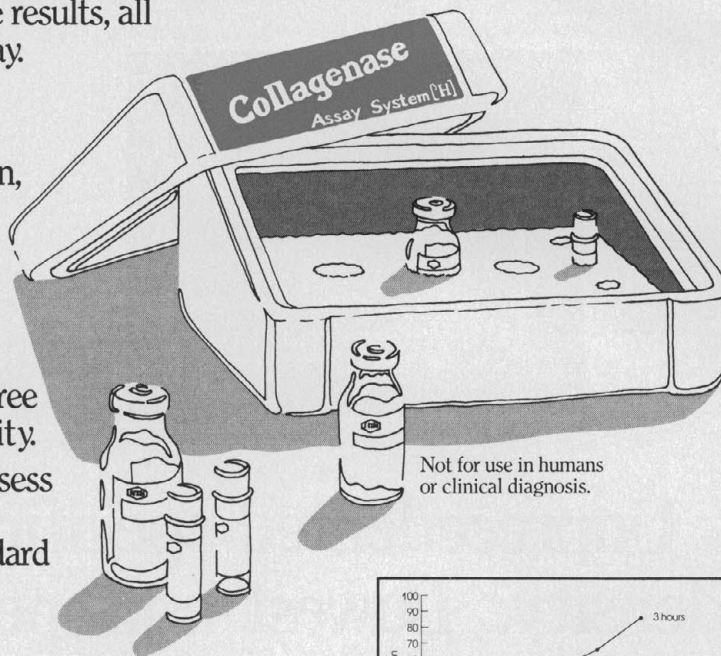
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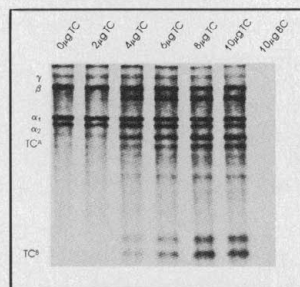
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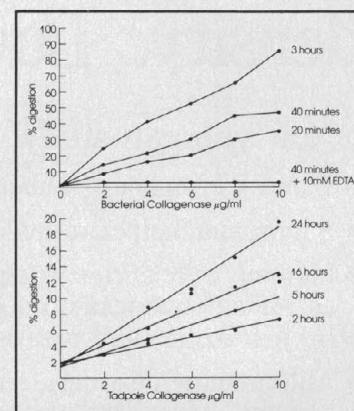
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- Isolation, purification, and characterization of interferons.
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- Progress in interferon cloning.
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- Mechanisms of antiviral actions.
- Immuno-modulatory actions of interferons.
- In vivo studies on pharmacology of interferons and their antitumor and antiviral actions in animals and in man.
- Results of clinical studies.

*Published by Mary Ann Liebert Inc., Publishers, New York, New York.

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Attendance will be limited to approximately 800.

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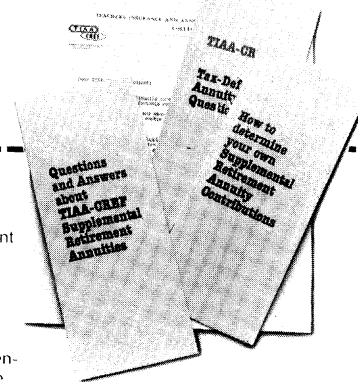
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The First Annual Conference on
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December 6-9, 1982
Conrad Hilton, Chicago, Illinois

Chairman: Dr. Dennis Smith, Group Leader, Discovery Research Systems, Lederle Laboratories

Vice Chairman: Dr. Peter Friedland, Research Associate, Dept. of Computer Science, Stanford University

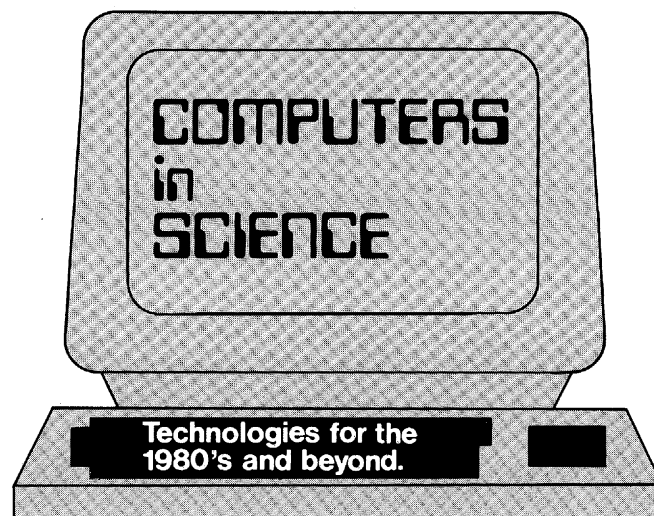
The conference's primary objective is to provide information on how changing computational technologies will influence future scientific research. Sessions will examine state of the art applications of existing technologies to specific areas of research as well as the impact of new developments on scientific research in the decades ahead.

Each conference day is devoted to a specific topic with lectures and presentations providing in-depth coverage of the subject:

- **Tuesday, December 7th — Products of the Technological Revolution: Building Blocks of Future Computer Systems.** A look at the underlying technology of future computer systems, emphasizing hardware developments and their role in providing powerful, distributed systems.
- **Wednesday, December 8th — Computational Systems: Man/Machine Synergism and the Conduct of Scientific Research.** Discussion on building useful research and development systems, focusing on the interaction of scientists with computers.
- **Thursday, December 9th — Scientific Communication and Collaboration: Conducting Research in the New Computational Environment.** An examination of the influence of computers, on how research is conducted, covering scientific collaboration, communication, resource sharing and the sociology of research in a new computational environment.

On Monday, December 6th, the day immediately preceding the main conference three Tutorials will be presented on the subjects of hardware, software, and communication technology. The Tutorials will provide intensive instruction on these subjects to provide a background for the main conference sessions to follow.

In addition, comprehensive exposition of equipment and software used in scientific computer applications will run concurrently with the conference. Company technical personnel will be on hand to assist attendees and to give demonstrations. Contributed papers in the form of posters or demonstrations are invited. Please check registration form to receive Tutorial information and/or Abstract forms where indicated.



Tuesday, December 7th — Morning lectures:

Microelectronics — Dr. Gordon Moore, Chairman of the Board/CEO, Intel Corp.

Personal Computers — Dr. Adele Goldberg, Principal Scientist/Area Manager, Software Concepts Group, Xerox Palo Alto Research Center

Local Area Networks — Dr. Robert M. Metcalfe, Chairman of the Board, 3COM Corp.

Shared Resources — Dr. C. Gordon Bell, Vice President of Engineering, Digital Equipment Corp.

Wednesday, December 8th — Morning Lectures:

Symbols and Software for Science — Prof. Edward A. Feigenbaum, Dept. of Computer Science, Stanford University

Methodology of Programming — Dr. Ira Goldstein, Manager, Application Technology Dept., Computer Research Center, Hewlett-Packard

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Thursday, December 9th — Morning Lectures:

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Evolution of Computer Networks — Dr. Robert Kahn, Director, Information Processing Techniques, Defense Advanced Research Projects Agency

Scientific Collaborations — Lynn Conway, Research Fellow/Manager, VLSI System Design Area, Xerox Palo Alto Research Center

Sociological Impact of Computing — Prof. J.C.R. Licklider, Laboratory for Computer Science, MIT

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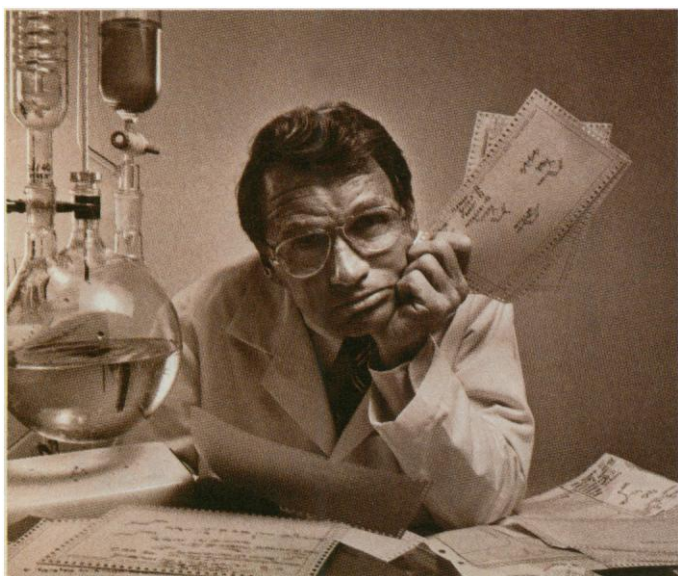
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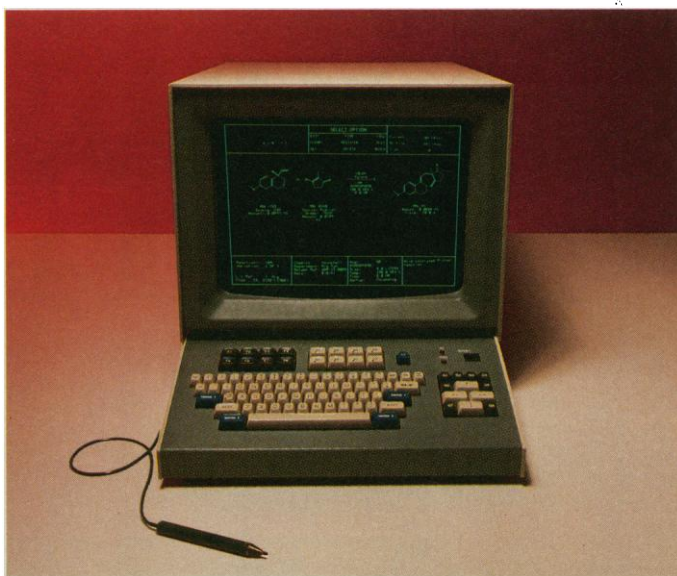
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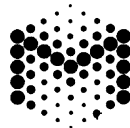
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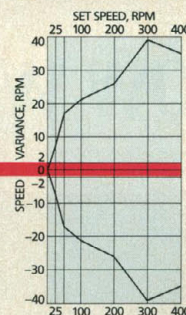
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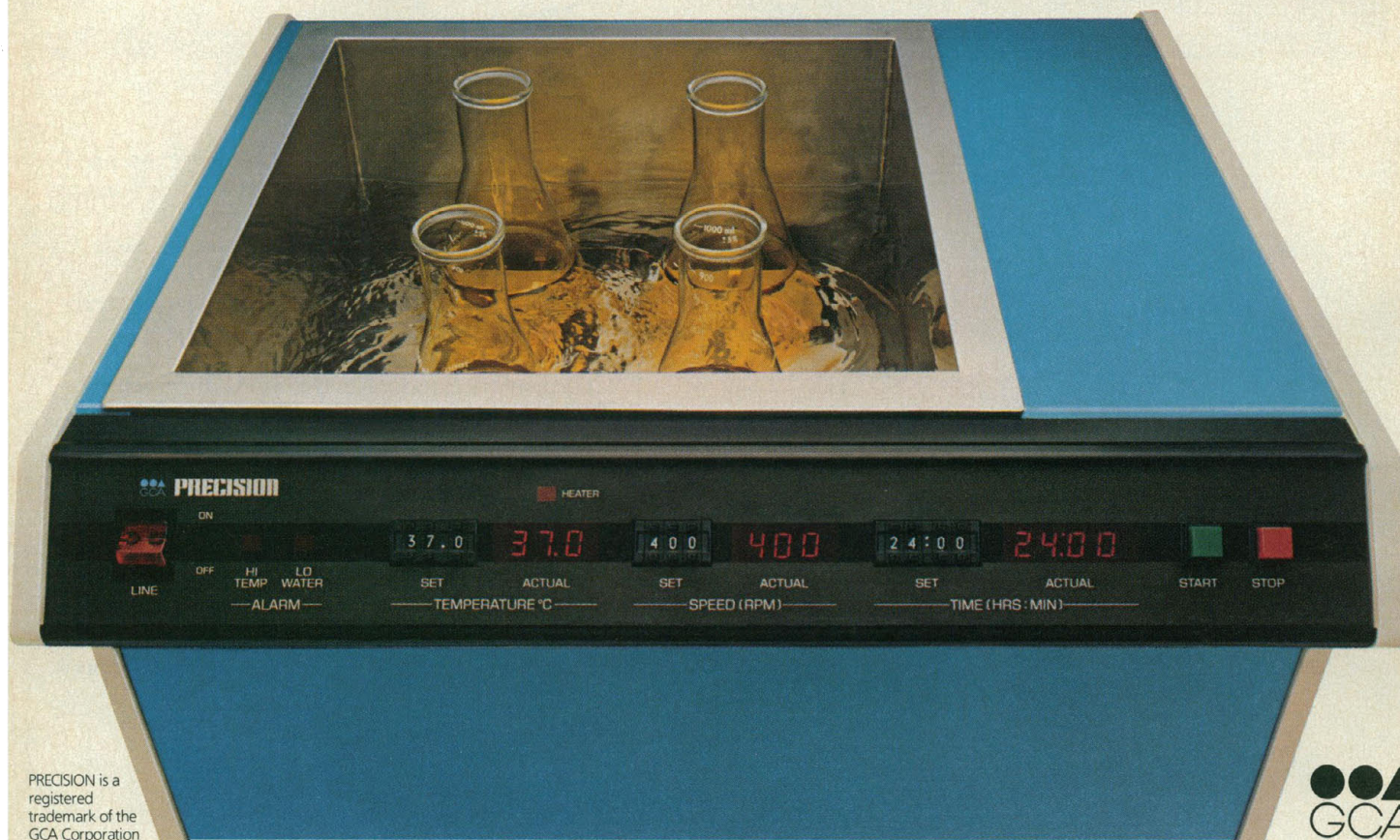
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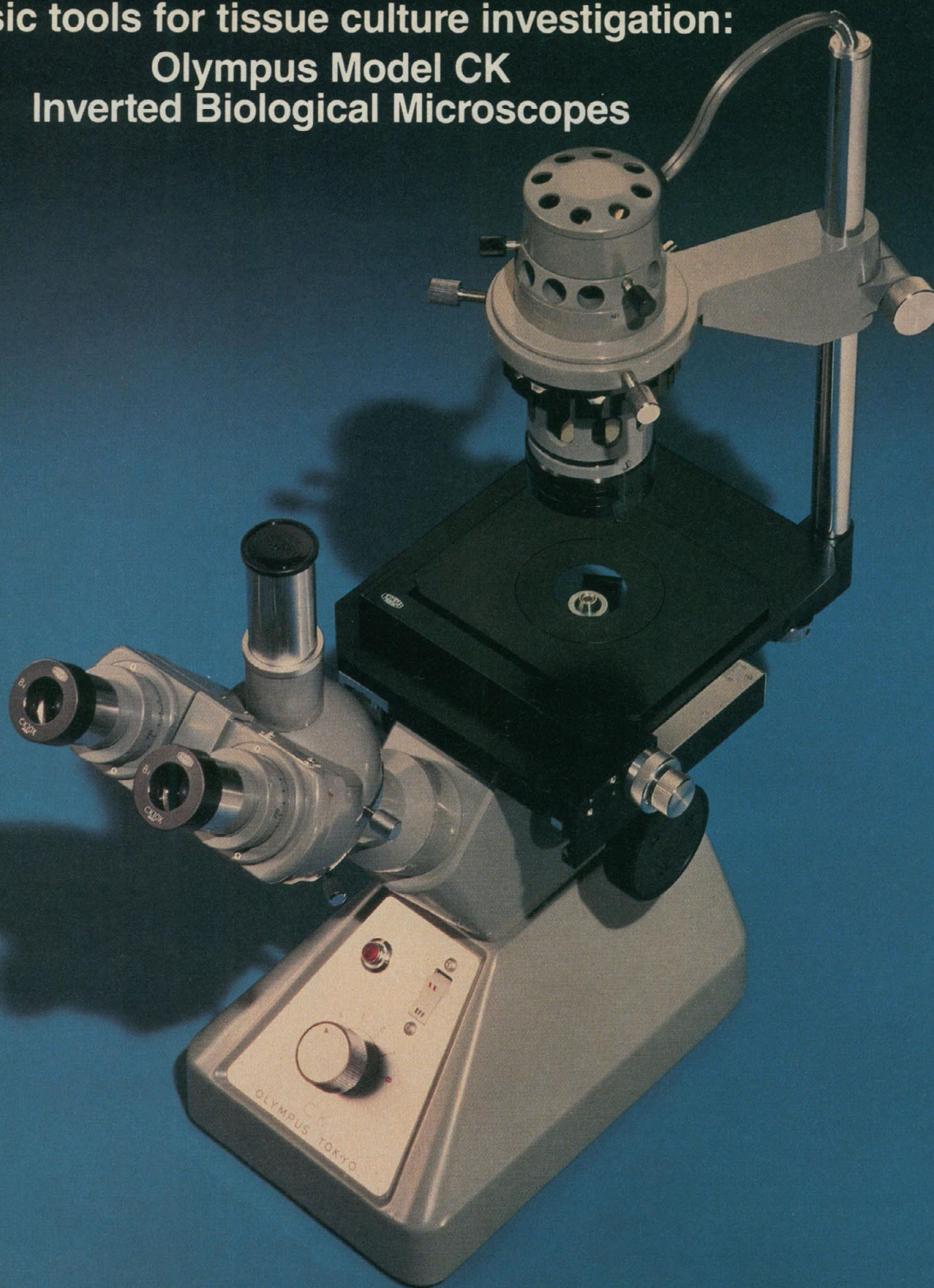


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Differing Values in Academia and Industry

Many universities are examining searchingly their relations with industry. The basic reason is financial. The academic community is nervous about federal funding of research. Some universities report that they have retained a satisfactory level of support, but half or more have not. Apprehension about federal support has been coupled with other financial problems of the universities brought on by recession and inflation.

In this environment it has become fashionable to look to industry as a possible source of funds. Already a number of universities have entered into contracts involving substantial sums, and additional arrangements will doubtless follow. In general, industry has not been devoting a sufficient sum to basic research within its own laboratories or elsewhere. It was treated to a lesson when a large number of companies were caught flat-footed by academic developments in molecular biology. Other sectors of industry have become concerned about future supplies of personnel trained in computer-related fields.

Despite an apparent basis for close cooperation between academia and industry, the likely outcome is far from a cure-all for the financial ills of the universities. The money spent by industry at universities is unlikely to top 10 percent of the federal funds they now receive. Close cooperation between universities and industry could lead to harmful tensions induced by competing value systems. Universities already have their share of such differences. The humanists look down on the engineers and vice versa; the various science departments usually have little interaction. However, the faculty share common goals in the pursuit of knowledge and in fostering the education of the young. Most of the faculty place these goals above that of attaining personal wealth.

The value system and the mode of conducting research and development in industry are quite different from those of academia. To survive, a company must make a profit. It must evolve with the changing times. And it must be well managed, with a clearly defined chain of command. The bankruptcy courts are very busy these days. Only the strong and nimble remain viable.

In industry, the pressure of the bottom line inevitably dictates policies with respect to R & D. The goal is not pursuit of knowledge; it is the attaining of proprietary advantage. Accordingly, research results obtained at industrial laboratories often go unpublished or are released slowly in the patent literature. In the university, fast publication of scientific findings is eagerly sought. Much of the activity in industry is conducted by interdisciplinary teams whose members are arbitrarily assigned to tasks. Projects may be suddenly terminated. Only a favored few in the typical industrial laboratory have the privilege of personally choosing a research area and sticking with it through discouraging phases of effort. This frenetic tempo is incompatible with the tempo of graduate training in the natural sciences. In their thesis research, it is essential that students pursue a line of inquiry patiently and in depth.

These examples of differing values and procedures make it obvious that close collaboration between academia and industry is likely to create new problems and tensions. That is not to say that cooperation is undesirable. One time-tested method of cooperation is that of consultation, preferably conducted off-campus. Professors spend at most an average of a day a week at this. They bring their expertise to industry and in turn learn of new developments and new job opportunities for their students.

However, some of the new arrangements between universities and industry come close to inserting an industrial enclave into the campus. It would be unfortunate if such examples were carelessly multiplied. Rather, emphasis should be placed on avoiding relationships that might damage the universities and their ability to carry out well their essential functions of undergraduate and graduate education.—PHILIP H. ABELSON

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