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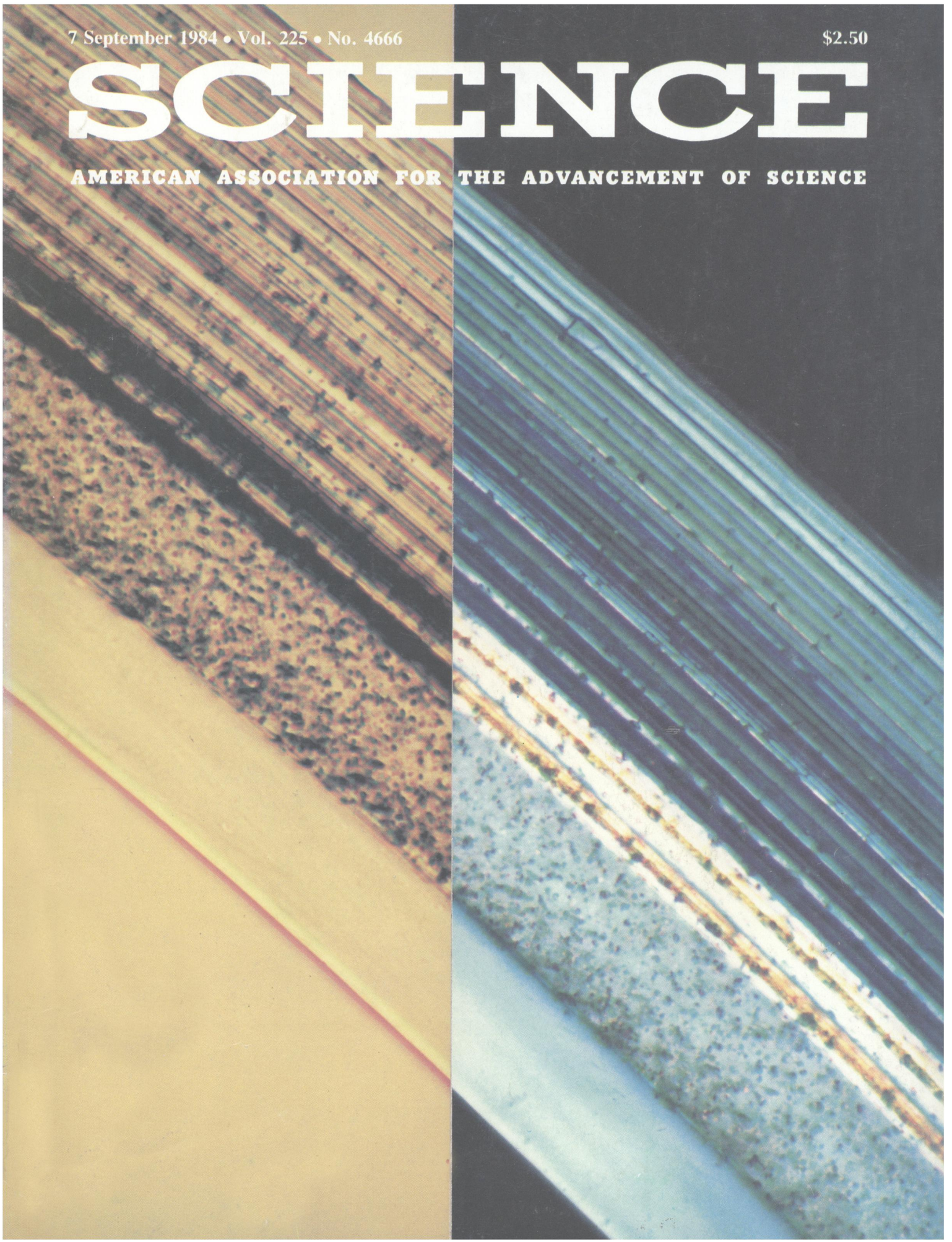
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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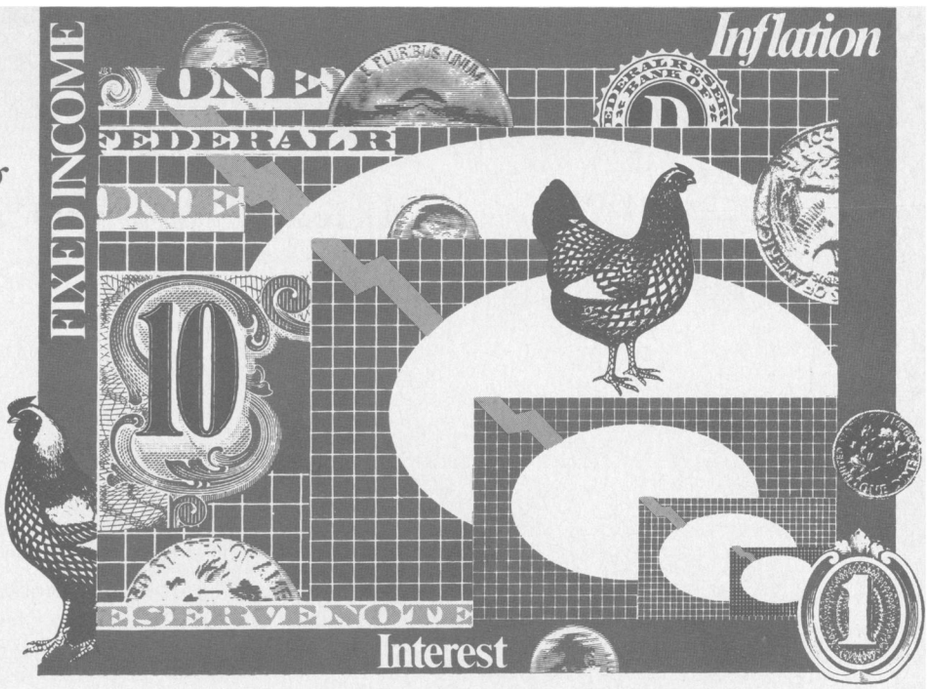
The Case of the Shrinking Nest Egg



Stanley and Anne Winston just couldn't understand why their nest egg was shrinking. They worked hard to keep it nourished—trying everything on the market to help it grow. Yet, mysteriously, it actually seemed to be getting smaller. And they didn't see how they could possibly put any more money into it without cutting their take-home pay.

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SCIENCE

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COVER

Photomicrograph showing a cross section of a water-swollen polyvinyl alcohol film (thickness, 0.18 millimeter) containing silver bromide precipitate. The precipitate was formed by immersing a 10-cubic-centimeter polyvinyl alcohol pouch containing 0.05*M* silver nitrate in 100 cubic centimeters of 0.05*M* sodium bromide for 16 hours. Silver nitrate–contacting side is up. The photograph was taken in polarized light with crossed (right) and uncrossed (left) polarizers. See page 1021. [K. F. Mueller, CIBA-GEIGY Corporation, Ardsley, New York 10502]

SECOND INTERNATIONAL CONGRESS ON

COMPUTERS IN SCIENCE

28 October - 1 November 1984

Washington Hilton, Washington DC

Chairman: Stephen R. Heller
Environmental Protection Agency, Washington DC 20460

THEME: Workstations for the Scientist

OPENING ADDRESS

Computer Education/Literacy for the Scientists – C.D. Martin, George Washington University, Washington, D.C.

SESSION TOPICS

Scientific Data Bases – L. Gevantman, National Bureau of Standards, Washington, D.C.
Computer Aided Molecular Design – R. Potenzone Jr., American Cyanamid Co., Stamford, Conn.
Artificial Intelligence – P. Friedland, Stanford University, Stanford, CA.
Biological Workstations – P. Armstrong, Intelligenetics, Inc., Palo Alto, CA.
Management of the Electronic Laboratory – R. Dessy, Virginia Polytechnic Institute, Blacksburg, VA.
Laboratory Automation and Robotics – J. Lemanowicz, Exxon Research and Engineering, Annadale, N.J.
Workshops – Joseph L. Modelevsky, Lilly Research Labs.
Molecular Biology Software: Conventions, distribution and exchange
Molecular Biology Computing: Perils, prospects, and payoffs
* Other Workshops to be announced

POSTER SESSIONS: WORKSTATION APPLICATIONS

Participants are invited to submit abstracts for the poster sessions. These abstracts will be reviewed up until the time of the meeting; however, only those accepted by 15 September 1984 will be listed in the conference program. For abstract forms contact address listed below.

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A large exhibit of state of the art hardware, software and systems will also be part of the overall conference.

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7 September 1984, Volume 225, Number 4666 **SCIENCE**

1 + 1 = 0: New Math for a New Age

One year ago America read with alarm *A Nation at Risk*, the indictment of public education by the Commission on Excellence in Education. Shortly afterward, the National Science Board issued a parallel, bleak report on education in mathematics, science, and technology. Both reports make the same points: test scores are low, academic requirements are inadequate, and teaching is no longer a prestigious profession.

Slowly, but with gathering momentum, the states are responding. California, Florida, Ohio, Texas, and others are increasing requirements: longer school hours here and more required courses there. Some states are even requiring competency tests—for teachers as well as for students.

As the political momentum of our educational crisis peaks, legislators often gravitate to the quick fix, to a nostalgic return to the good old days of stern requirements and no-nonsense exams. It seems that the new regime in education is committed to the basics, even if it means going backward to get there. But today's students need the science and mathematics of the future, not of the past. The world of today's student is dominated by genetic engineering and computer modeling, by new tools used to solve new problems. Yet the world of school tests and texts, too often, is full of old tools applied to old problems.

Mathematics provides a good example. Traditional school mathematics aims to perfect arithmetic skills (such as percentage calculations and long division) as a basis for algebra, which itself becomes the cornerstone of trigonometry, analytic geometry, and calculus. America was built with these tools, applied by generations of engineers and scientists to the physical environment in which we live.

But today's growth industries are dominated by information, which is abstract and immaterial. Whereas the material world is modeled by calculus, the language of continuous change, the immaterial world of information requires discontinuous, discrete mathematics. Both genetic codes and computer codes are intrinsically discrete. Discrete mathematics basically deals with fancy ways of arranging and counting. It can be used to enumerate genetic patterns and to count the branches in computer algorithms; it can be used to analyze the treelike branching of arteries and nerves, as well as the cascading options in a succession of either-or decisions. It can tell us how many things are there as well as help us find what we want among a bewildering morass of possibilities.

Courses and seminars in discrete mathematics are being introduced in colleges across the land. Many computer scientists are urging beginning students to study discrete mathematics before they study calculus. Recent recommendations for preparation of secondary school teachers of mathematics add both discrete mathematics and computer science to the list of required courses.

Reform of school mathematics must reflect this new mathematics. Requiring more tests is of no use if the tests examine only the old mathematics; increasing time in class is of no benefit if it only reinforces old traditions. Standardized tests must be changed, new textbooks must be written, and teachers must be provided with opportunities in substantive workshops to learn this discrete, computer-oriented mathematics.

In mobilizing for excellence in mathematics education, we must create a new curriculum founded on the principle that mental arithmetic is more valuable than mechanical calculation, that solving problems is more important than solving equations. Mathematics in the computer age must comprehend and supplement the computer, not merely imitate it. Arithmetic in the computer age relies as much on the concept of "bit" as on the concept of number. But inside a computer, bits do not add up, they just flip on and off. The verity of nostalgic arithmetic is that $1 + 1 = 2$; but in the new mathematics of the computer age, we must also teach that $1 + 1 = 0$.

—LYNN ARTHUR STEEN, *Department of Mathematics, St. Olaf College, Northfield, Minnesota 55057*

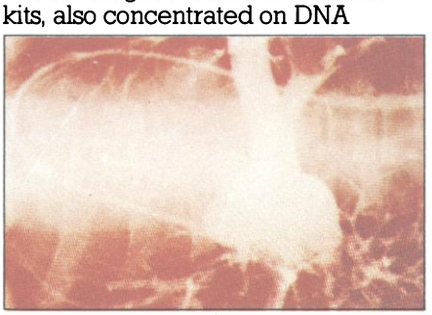
PORTON INTERNATIONAL

Advanced development and production

It is also recognised that with the current state of the art in bioprocess control systems for development and production, where bioprocessors are primarily controlled on such macroscopic parameters as pH, temperature and dissolved oxygen, the need is now more often for product or process specific monitoring at a cellular level. Porton International's subsidiary, the

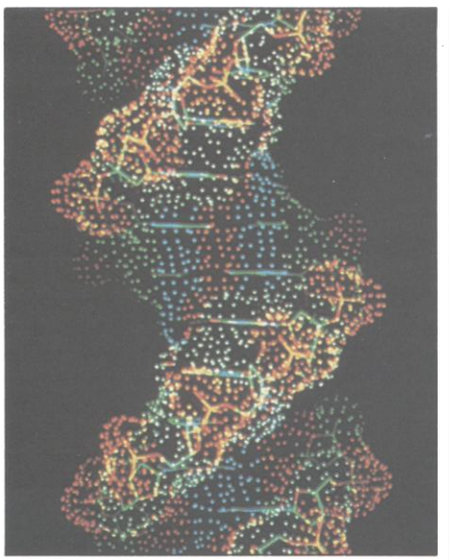
molecular biology research company, **IGB Products** based in San Leandro, California, is concentrating on the requirements for biosensors and other such control systems.

Sensing elements are not only required for bioprocess control but also for diagnostic instruments and kits, also concentrated on DNA

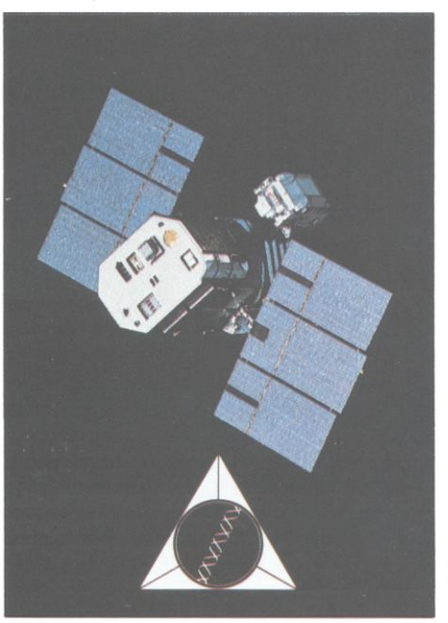


probes, monoclonal antibodies and specific enzymes etc. related to the diagnostic market.

Any diagnostic system needs to be proven, clinically validated and marketed, and Porton International's subsidiary, the clinical reference company, **International Medical Diagnostics** with its headquarters in Los Angeles, not only is able to prove and gain acceptance of the new diagnostic tools emerging from IGB Products' research, but offers a highly sophisticated diagnostic service to the medical community.

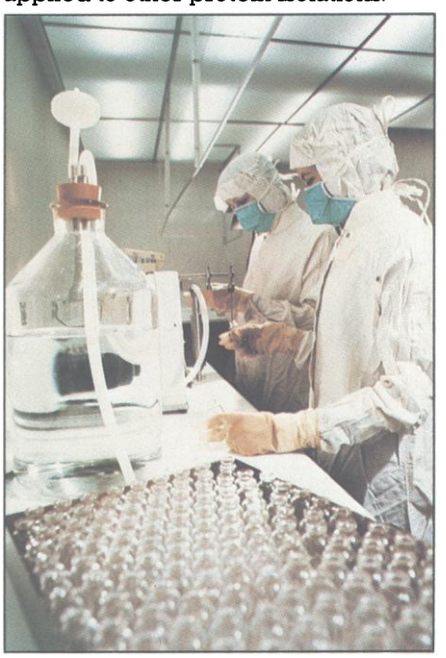


Speywood Laboratories' Factor VIII product, HYATE: C



OMEC International — worldwide biotechnology information at the interface: science, technology and commerce

Specific therapeutics are of particular interest to the group especially where successful production is dependent on highly developed, and proprietary, group technology. **Speywood Laboratories,** Porton International's subsidiary, is the only supplier of the high quality Porcine Factor VIII for the treatment of haemophiliacs with inhibitor; their success with this product was completely dependent on the unique capability they have developed in separation and purification of proteins. These skills are now being applied to other protein isolations.



The biotechnology market is rapidly changing and highly competitive and it is essential for any organisation to have a full understanding of the state of the market, development and the competitive position on a world-wide basis. Porton International's subsidiary, the biotechnology information group, **OMEC International**, with headquarters in Washington DC, can rapidly assess the development status, evaluate patent applications and analyse the market situation for any of the group's new products. OMEC also provides a similar information service to companies and organisations outside the group and publishes standard reference works, digests and news information on all aspects of the biotechnology market worldwide.