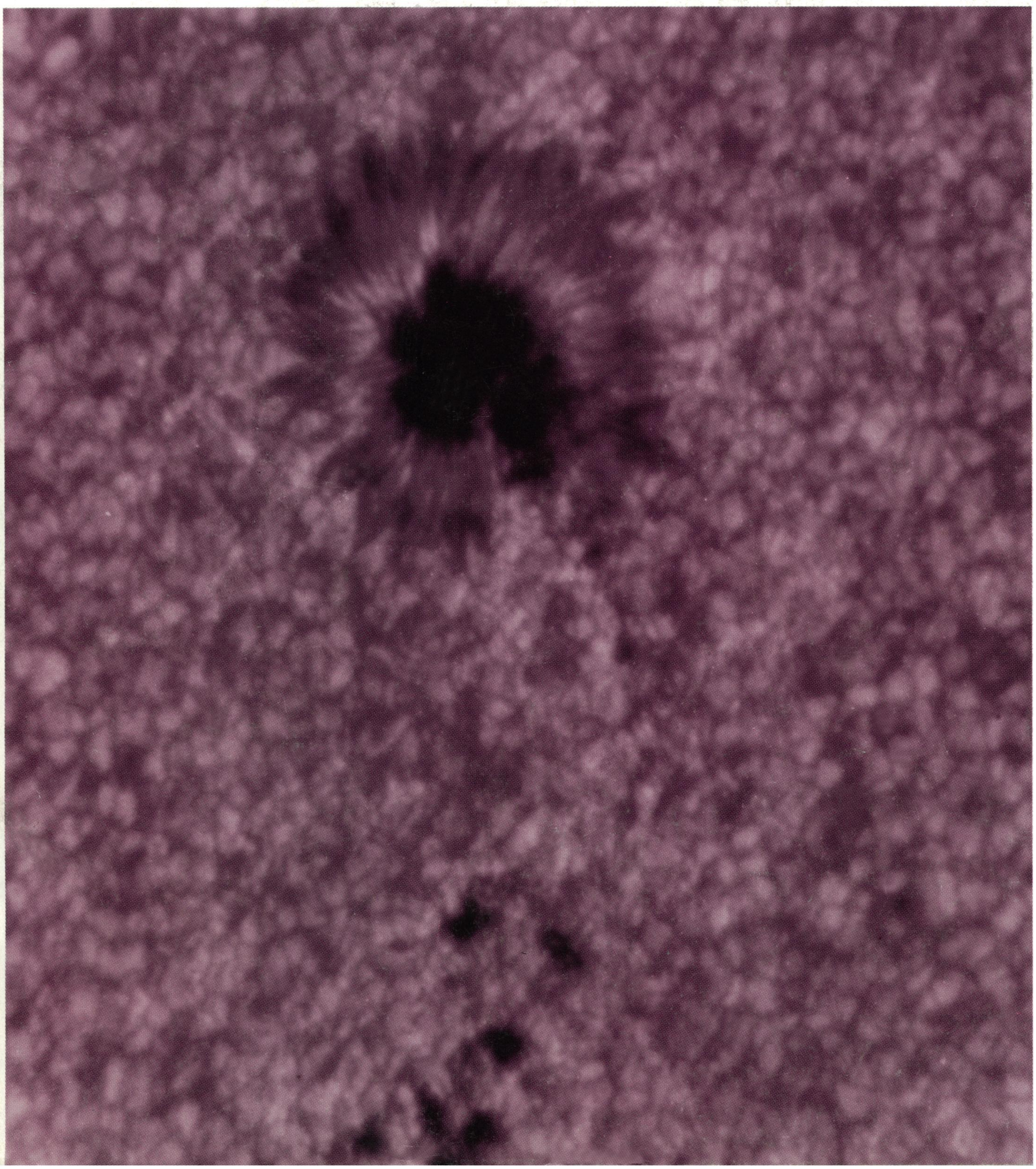
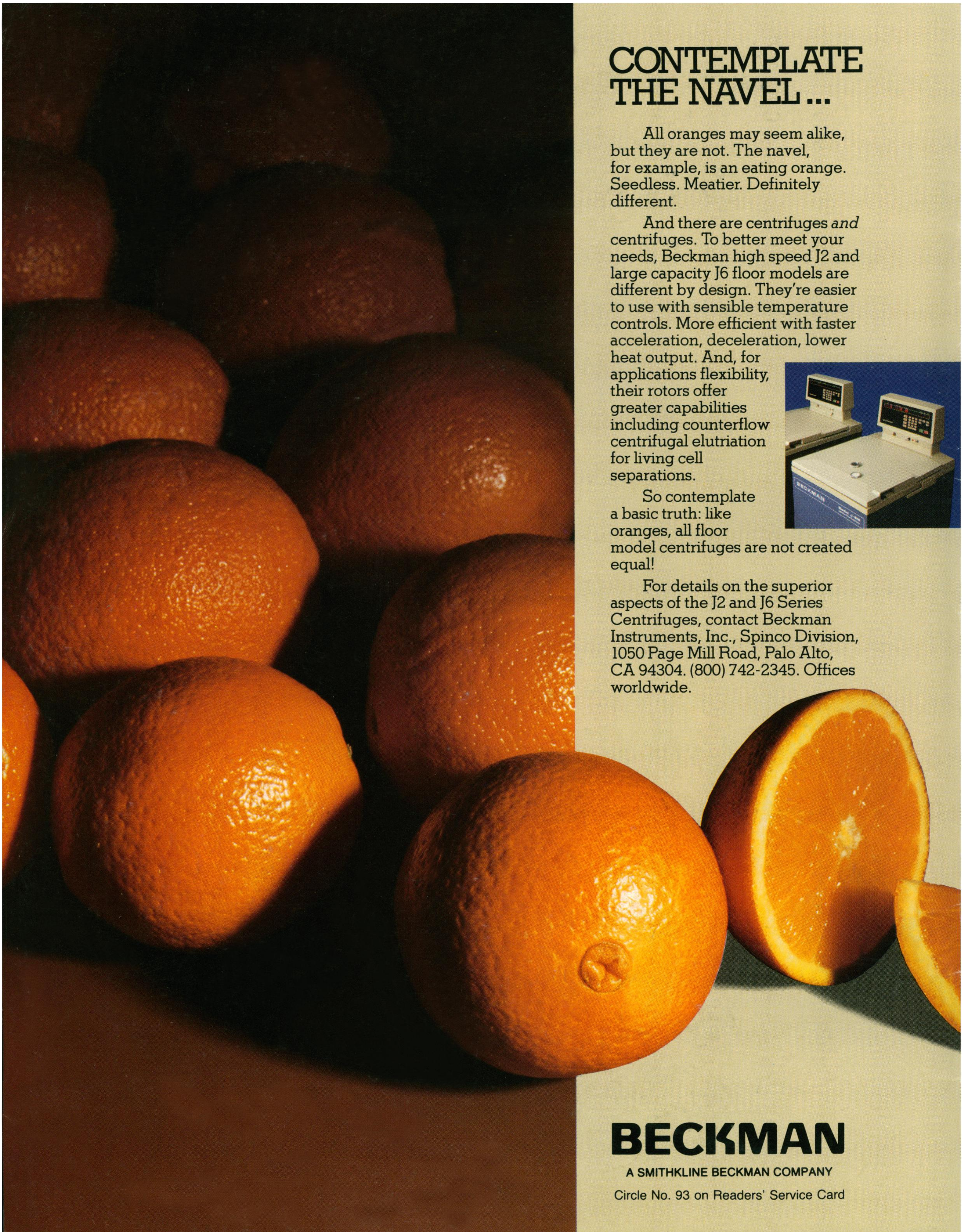
American
Association for the
Advancement of
Science

Science

27 November 1987 $2.50
Vol. 238 ▪ Pages 1203–1326




CONTEMPLATE THE NAVEL...
All oranges may seem alike, but they are not. The navel, for example, is an eating orange. Seedless. Meatier. Definitely different.
And there are centrifuges *and* centrifuges. To better meet your needs, Beckman high speed J2 and large capacity J6 floor models are different by design. They're easier to use with sensible temperature controls. More efficient with faster acceleration, deceleration, lower heat output. And, for applications flexibility, their rotors offer greater capabilities including counterflow centrifugal elutriation for living cell separations.
So contemplate a basic truth: like oranges, all floor model centrifuges are not created equal!
For details on the superior aspects of the J2 and J6 Series Centrifuges, contact Beckman Instruments, Inc., Spinco Division, 1050 Page Mill Road, Palo Alto, CA 94304. (800) 742-2345. Offices worldwide.
BECKMAN
A SMITHKLINE BECKMAN COMPANY
Circle No. 93 on Readers' Service Card

Come out of the "Ice Age" of electrophoresis.

You've coped with cumbersome, unreliable temperature control long enough.

Announcing the E-C Isothermal Controlled Electrophoresis System — I-C-E for short.

I-C-E's new high tech Quantum digital readout control provides temperatures from 0° C to 80° C with setpoint of (±) 0.1° C.

Want to cool **and** heat rapidly in one undisturbed sequence? With I-C-E, for example, you can separate at 4° C and follow immediately with **in situ** enzyme incubation at 37° C, or use ramp heating to 60° C for rapid overlay development.

Need one versatile system that will do it all? That's I-C-E. For 1-D, 2-D, immuno, SDS, isoelectric focusing, and standard horizontal electrophoresis.

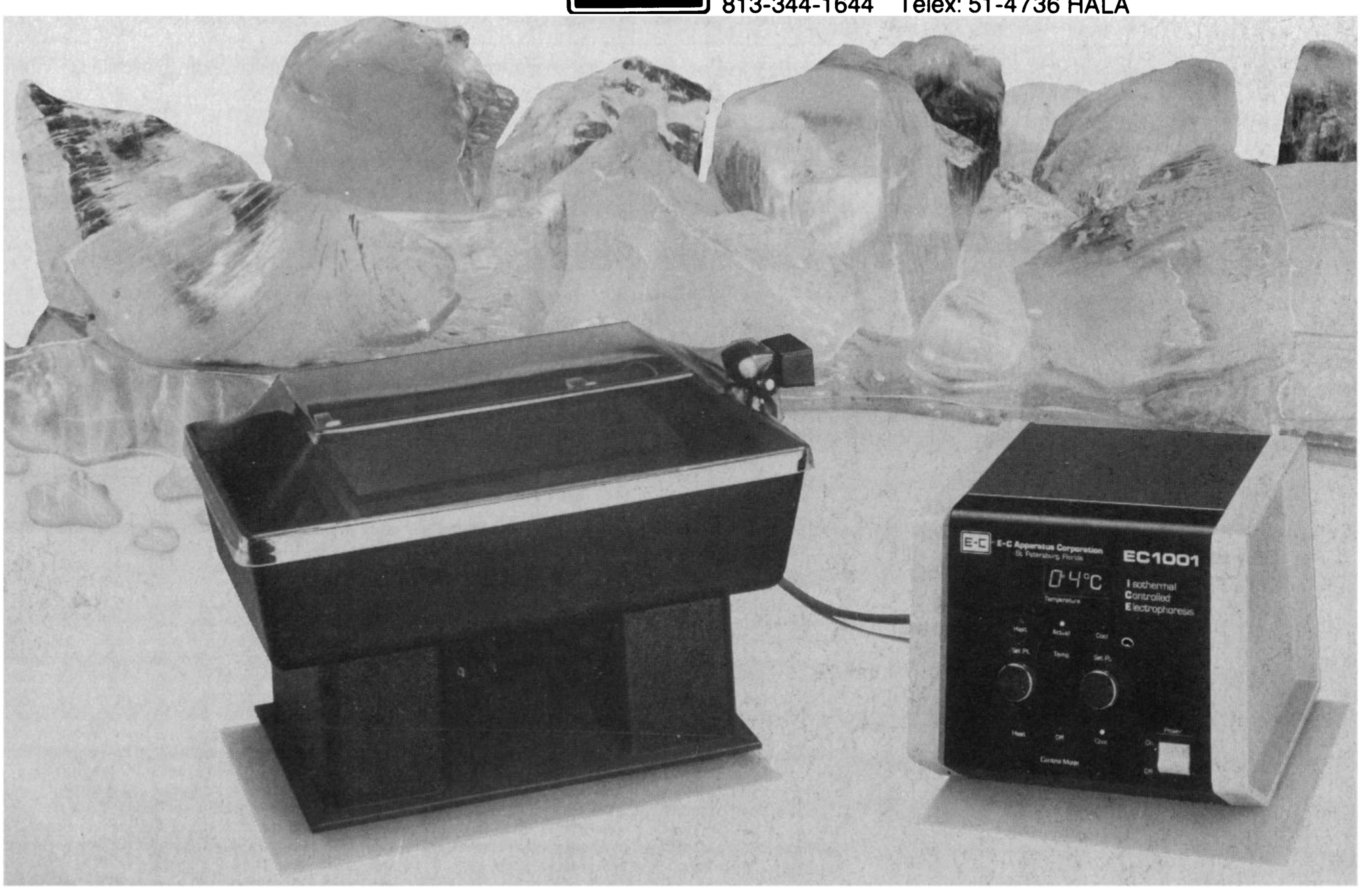
Exclusive! I-C-E system includes isoelectric focusing cover with moveable platinum electrodes, and two L-shaped buffer tanks with platinum electrodes for standard 1-D and 2-D immuno separations without turning the gel.

Be kind to your budget. I-C-E, today's state of the art in electrophoresis systems, is only $1,695 fob St. Petersburg, FL.

Call Technical Service at 1-800-624-2232 (Ext. 67) (in Florida 1-813-344-1644) for more information.

E-C

E-C Apparatus Corp.
3831 Tyrone Boulevard N.
St. Petersburg, FL 33709
813-344-1644 Telex: 51-4736 HALA



Circle No. 127 on Readers' Service Card

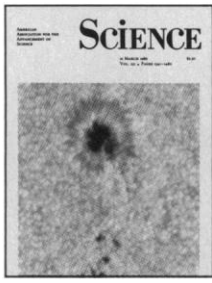
American Association for the Advancement of Science

SCIENCE

ISSN 0036-8075
27 November 1987
Volume 238
Number 4831

■ **SCIENCE is published weekly on Friday, except the last week in December, and with an extra issue in February by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005.** Second-class postage (publication No. 484460) paid at Washington, DC, and at an additional entry. Now combined with **The Scientific Monthly®** Domestic individual membership and subscription (51 issues): $65. Domestic institutional subscription (51 issues): $98. Foreign postage extra: Canada $32, other (surface mail) $27, air-surface via Amsterdam $65. First class, airmail, school-year, and student rates on request. Single copies $2.50 ($3 by mail); back issues $4 ($4.50 by mail); Biotechnology issue, $5.50 ($6 by mail); classroom rates on request; Guide to Biotechnology Products and Instruments $16 ($17 by mail). **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, DC 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

■ 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 foster scientific freedom and responsibility, 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.



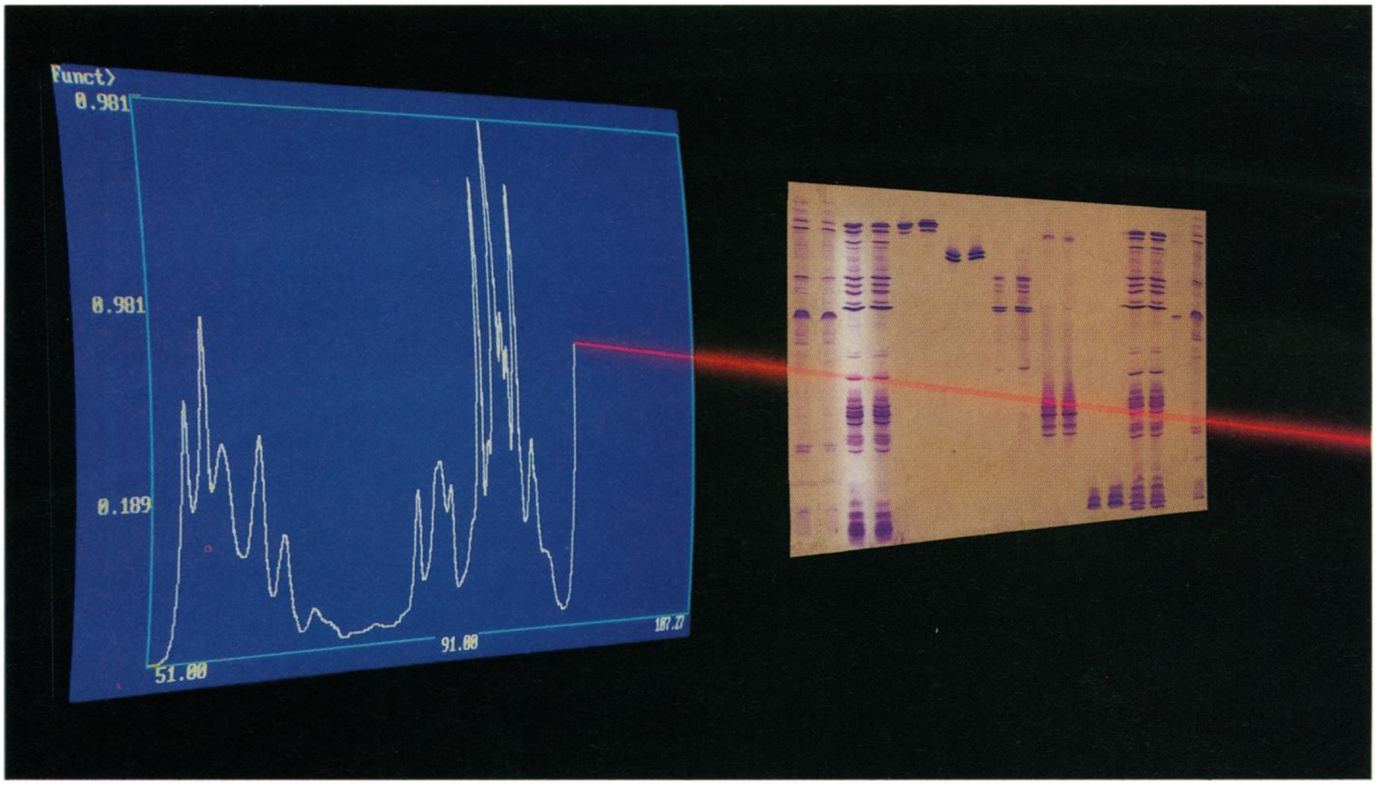
COVER A white-light image of an active region on the sun taken by the Solar Optical Universal Polarimeter instrument during the Spacelab-2 mission on board the space shuttle Challenger. The granular structures are due to convection in the solar atmosphere. The dark sunspot is a region of strong magnetic fields and is approximately 14,000 kilometers in diameter. See page 1264. [Lockheed Palo Alto Research Laboratory, Palo Alto, CA 94304]

Technical Comments

Book Reviews

Products & Materials

Bring the facts to light



With 55 μm resolution and 4 OD

The new UltroScan® XL is a laser densitometer that overcomes the difficulties of accurately quantifying electrophoretic gels. With the pin-point precision of laser light, the resolution achieved is an incredible 55 μm. This means that significantly more information can be found and quantified from even the most closely stacked bands in IEF gels, PhastGel™, as well as 35 mm transparancies of your results.

The power of this intense helium-neon, laser light source guarantees a linear range of up to 4 OD. Consequently gels with high background, blotting membranes, autoradiograms and the darkest of bands can all be scanned with exceptional accuracy. And using a unique, single-dimension, area scanning feature you can fully quantify bands, dots and spots of varying widths.

Plus 2 integration and 4 background subtraction methods

The GelScan™ XL Evaluation Software allows you to analyse, even more accurately, the data obtained from this penetrating laser densitometer. To compensate for distortions such as variations in staining and sample loading, you can create standard curves using internal and external standards. The GelScan XL gives you the choice of four, powerful background subtraction methods to cover all situations, from a slight baseline drift of a gradient gel, to the complex background variation of a badly destained blotting membrane. And partially resolved peaks can be accurately quantified using Gaussian fit integration.

GelScan XL software is as user-friendly as it is powerful, offering component identification not only by peak positions and peak numbers, but also by isoelectric point, molecular weight and by name.

The combination of UltroScan XL and GelScan XL will give you incomparable accuracy and reproducibility. A combination to help you bring new facts to light.

Contact your local Pharmacia-LKB representative today for some revealing facts about revealing facts.

LKB

Pharmacia LKB Biotechnology Inc., Piscataway, New Jersey 08854, Information: (800) 526-36 18, In NJ: (201) 457-8000.

Circle No. 70 on Readers' Service Card

Ozone hole

EACH spring in the Southern Hemisphere, a gaping hole has been appearing in the ozone layer above Antarctica (pages 1253 and 1258). Laboratory experiments by Molina *et al.* and Tolbert *et al.* show what chemical reactions might account for the catalytic destruction of ozone—two molecules of ozone yield three of oxygen—on the surfaces of ice particles in the stratosphere. Stratospheric clouds are thought to consist mostly of ice and nitric acid. Relevant chemical species were shown to stick, diffuse, and react at accelerated rates when exposed to ice particles at temperatures approximating those of stratospheric clouds (about 200 K): gas-phase hydrochloric acid and chlorine nitrate generated gas-phase chlorine and other chlorine-containing species that can quickly photolyze to free radicals. During the reactions, certain nitrogen species were suppressed, and thus all conditions were fulfilled for creating an environment in which catalytic destruction of ozone by halogenated free radicals can take place.

Spacelab-2 studies

THE flight of the space shuttle that began late in July 1985 was dedicated to experiments and observations in space physics and astronomy; some of the findings are now reported (pages 1260, 1264, and 1267). Mendillo *et al.* describe properties of "ionospheric holes" that were generated when shuttle engines were fired and neutral exhaust gases injected into the ionosphere; the interactions of gases with ionospheric molecules depleted plasma and produced the holes. One hole served as a temporary window through which low-frequency radio waves from celestial sources (that are otherwise blocked) were detected from an observatory on the earth. Shine *et al.* describe various phenomena associated with sunspots (cover) that were detected by high-resolution white light polarimetry and analyzed with interactive video equipment and image processing techniques. Fine structures of the solar chromosphere (the surface layer above the region visible to the eye) and the transition zone between it and the sun's hot corona were studied by ultraviolet spectroscopy; Dere *et al.* discuss dynamic properties of various structures in relation to the unusual temperature profile (varying over many orders of magnitude) that characterizes the solar atmosphere.

Halting leukemia growth

FOR a rat to be able to reject leukemia cells it must produce sufficient quantities of differentiation factor (DF) (page 1278). This factor channels the cell's metabolic activity away from unchecked proliferation in the undifferentiated state and toward terminal differentiation and eventual cell death; in the absence of DF, the cells remain leukemic and can quickly kill the host. Jimenez and Yunis show that 7-day-old rats that typically die by day 16 from chloroleukemia (a form of myelogenous leukemia that is similar to the human disease) can be protected if they are given an injection of DF; 21-day-old rats are not normally killed by the leukemia cells, and they were found to produce on their own much more DF than did the younger rats. The injected DF caused the leukemia cells to differentiate into macrophages, and this occurred even if the tumor was enclosed in a chamber inside the host. These results suggest that injections of DF might have a role in the therapy of patients with myelogenous leukemia.

Protein anchor

A protein can be anchored in a cell membrane in one of several ways (page 1280). One strategy common to the decay accelerating factor (DAF) and several other proteins is attachment through a hydrophobic glycosylated phosphatidylinositol (PI) complex. PI forms a complex with ethanolamine and carbohydrates; the carboxyl group at the protein's carboxyl terminus links covalently to ethanolamine. Caras *et al.* fused a small portion (the 37 terminal amino acids) of DAF to a truncated, secreted (not membrane-bound) form of the protein glycoprotein D (gD-1) from herpes simplex virus type 1. The fusion protein was expressed in and on cells; the terminal segment of DAF apparently carried the signals for covalent attachment of gD-1 to the PI anchor complex. The signals for protein-to-anchor linkage are not defined, but all proteins that attach with PI anchors have hydrophobic domains in the carboxyl terminus; these may act as transient membrane anchors that later are clipped and replaced by PI anchors. Proteins that use PI anchors are totally exposed on the cell's surface; thus, PI anchoring may be useful for making new biologic reagents.

Chloroquine-resistant malaria parasites

SOME strains of the malaria parasite *Plasmodium falciparum* are resistant to the drug chloroquine whereas other strains are susceptible to its effects; kinetic studies of accumulation and release of the drug indicate why this is so (page 1283). Both resistant and susceptible parasites accumulated chloroquine at the same initial rate but, in resistant strains, the rate of accumulation fell off rapidly after 4 minutes: resistant strains released 50% of accumulated chloroquine in 2 to 3 minutes, but susceptible strains took longer than 85 minutes to release the same amount of drug. The accelerated release of chloroquine by resistant strains could be slowed by several calcium channel blockers, an antibiotic, and an inhibitor of microtubule function. Krogstad *et al.* point out that because some of these same decelerating substances slow drug release from multidrug-resistant cancer cells as well, drug clearance in these two systems may be mediated by similar cellular mechanisms. Furthermore, the rapid efflux phenotype may be a common feature of certain resistant *Plasmodium* strains in all regions of the world—West Africa, South America, and Southeast Asia—where they have appeared.

SCIENCE

27 NOVEMBER 1987
VOLUME 238
NUMBER 4831

Federal and Trade Deficits

If the budget deficit and especially the foreign trade deficit are substantially curtailed soon, great damage will probably be averted. However, continuation of present trends for an indefinite period could make the recent Wall Street crash only a prelude to other, more serious sequelae.

Some economists have written that the foreign trade and budget deficits are closely related. There is a partial, but not a one-to-one, relation. Lowering the budget deficit will not eliminate costs of oil imports. Other economists have stated that lowering the value of the dollar will cure the trade deficit. Although some improvement in competitiveness will arise from a weak dollar, that is no cure-all.

The "Advance report on U.S. merchandise trade: September 1987," prepared by the U.S. Department of Commerce and issued 12 November provides useful information on the matter. A surficial examination of the report showing that the September deficit was less than that in August gave rise to a 1-day rally on Wall Street. But numbers for 1 month are not necessarily a faithful indication of what is occurring. The total numbers for the third quarter and for the first 9 months of 1987 show a poorer performance than the corresponding 1986 figures, that is $46.234 billion versus $44.828 billion for the third quarter and $128.165 billion versus $123.452 billion for the first 9 months.

The weak dollar has had a beneficial effect on our trade deficit with the European Economic Community. In the first 9 months of 1987, the imbalance was $17.643 billion versus $20.623 billion the year before. There was no improvement in trade with Japan ($44.323 billion versus $43.028 billion).

The large and more intractable problems are trade relations with newly industrializing countries and increasing use of imported oil. This year our imports of oil and its products will cost about $44 billion versus about $38 billion in 1986. The growth of our trade imbalance with East Asian countries—Taiwan, Korea, Hong Kong, and Singapore—is symptomatic of additional problems we will encounter with industrializing countries. During the first 9 months of 1987 our trade deficit with the four countries grew to $28.842 billion from $22.553 billion in 1986. Their currencies are not tied to the yen or Deutsche mark but rather are roughly aligned with the dollar. Thus weakening the dollar further will not cure our deficit with the four countries. A rapidly rising portion of U.S. imports from these countries is high-tech or other products that in the past have been produced only in advanced industrialized countries. Their exports to us are about three times their imports from us, as is the case in our trade with Japan. Other developing countries with which the United States has substantial trade deficits include Brazil, Mexico, and the People's Republic of China. During the first 9 months of this year, our trade deficit with China grew to $2.896 billion from $1.409 billion in the corresponding months of 1986.

In the future our worst problem is likely to be demand for imported oil. Domestic production is down and will continue to decline. Completions of oil wells in the past 12 months have been at half the rate of 2 years ago. At the same time, consumption of products has increased. This is notably true of transportation liquids, uses of which are setting all-time records. Federal actions to increase the speed limit and decrease the mandated mileage for new cars have been moves in the wrong direction.

In the time between February 1985 and the present, a very large drop in the comparative value of the dollar slowed, but did not stop, the increase in the trade deficit. However, it made tangible assets in the United States look cheap, and foreigners are openly and surreptitiously buying up choice real estate, production plants, and other items. In terms of yen or Deutsche marks, members of OPEC are receiving about one-third the currency per barrel of oil that they obtained in 1985. At some point, they might demand payment in a strong currency.

Congress is aware that we must do something about the two deficits. But the thousand-page trade bill, if passed, would probably be vetoed and, if enacted, would make little difference. Washington will provide leadership, but only if the people demand it. The dawdling behavior of Congress and the Administration with respect to budget-deficit reduction suggests that an additional and more unpleasant shock than occurred on 19 October will be required before really significant actions are taken.—PHILIP H. ABELSON

Quality separations demand quality systems

And that means Econo-Column® chromatography systems from Bio-Rad.

Complete systems to meet your specifications

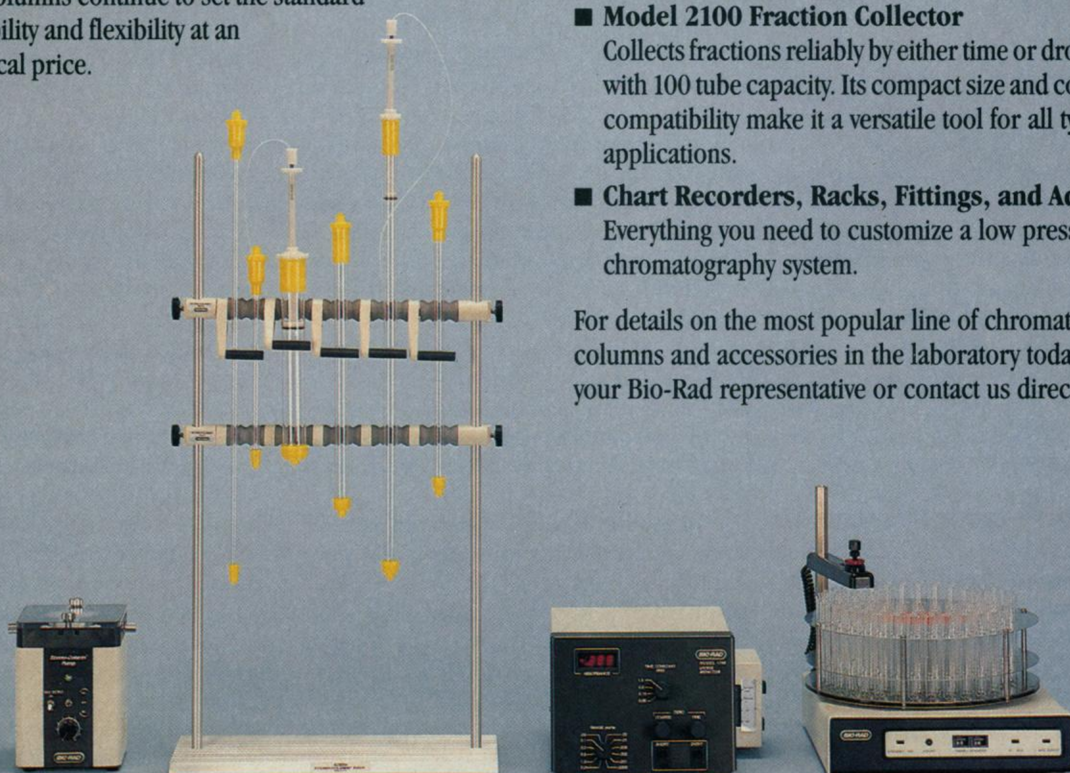
We offer a wide selection of quality columns, peristaltic pumps, detectors, and fraction collectors. That makes it easy to tailor an Econo-Column low pressure system to your application. The components work as a system, and our full range of connectors, adaptors, and tubing makes plumbing a cinch.

New Updated Column Design

Now we have Luer-lock fittings for convenience and leak free operation. And we've added a new 5.0 cm ID column. As they have for years, the Econo-Column chromatography columns continue to set the standard for reliability and flexibility at an economical price.

- **Econo-Column pump**
  0.6 to 325 ml/hr per channel flow rate is suited for most applications.
- **Model 1740 UV/VIS Detector**
  Unsurpassed sensitivity, 10 different wavelength filters from 214 to 660 nm, and cold room compatibility add up to an unbeatable package.
- **Model 2100 Fraction Collector**
  Collects fractions reliably by either time or drop count with 100 tube capacity. Its compact size and cold room compatibility make it a versatile tool for all types of applications.
- **Chart Recorders, Racks, Fittings, and Adaptors**
  Everything you need to customize a low pressure chromatography system.

For details on the most popular line of chromatography columns and accessories in the laboratory today, call your Bio-Rad representative or contact us directly.



BIO-RAD

Chemical Division

1414 Harbour Way South
Richmond, CA 94804
(415) 232-7000
800-843-1412

Also in Rockville Centre, NY; Hornsby, Australia; Vienna, Austria; Mississauga, Canada; Watford, England; Munich, Germany; Hong Kong; Milan, Italy; Tokyo, Japan; Utrecht, The Netherlands; and Glattbrugg, Switzerland.

Circle No. 94 on Readers' Service Card

Don't waste precious product waiting for answers from your fast protein LC!

HRLC™ MA7 cartridges give you higher resolution in half the time.

For rapid purification monitoring, you can't beat protein HRLC (high resolution liquid chromatography) from Bio-Rad. As the chromatogram shows, immunoglobulin purity can be measured in as little as *two minutes.* That allows you to change your large scale purification conditions very quickly in order to maintain optimum purity and activity. On the other hand, slower techniques such as "fast" protein LC can be risky. You could lose valuable product before detecting a purification problem—simply by waiting around for answers.

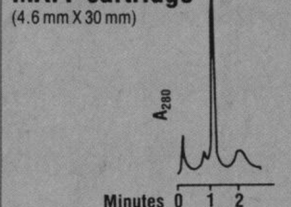
HRLC offers you a lot more than faster results and higher resolution. It requires less protein per analysis—as little as 300 ng. From every standpoint (including cost), HRLC is your best guarantee against losing large amounts of your valuable product before you can assess its purity.

It's the Chemistry that Counts™

HRLC MA7 cartridges out-perform conventional fast protein LC columns because of the unique chemistry involved. The nonporous nature of the HRLC MA7 media allows ion exchange to take place on the *surface* of the bead. As a result of these fast exchange kinetics, separations and regenerations occur much faster than is possible with conventional columns. (See table).

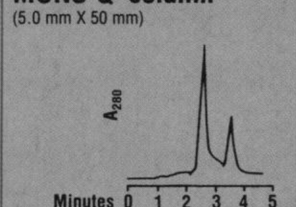
Analysis of IgG in MOPC 21 ascites fluid

MA7P cartridge
(4.6 mm X 30 mm)



Buffer A 16 mM Tris, pH 8.5
Buffer B 16 mM Tris, 0.5 M NaCl, pH 8.5
Flow Rate 2.0 ml/min
Gradient 0 to 100% B in 2.0 min

MONO Q® column
(5.0 mm X 50 mm)



Buffer A 16 mM Tris, pH 7.7
Buffer B 16 mM Tris, 0.5 M NaCl, pH 7.7
Flow Rate 1.0 ml/min
Gradient 20 to 100% B in 2.0 min hold at 100% B for 3 min

Mono Q is a registered trademark of Pharmacia Fine Chemicals.
IBM is a registered trademark of International Business Machines.

Comparison of the HRLC MA7P cartridges and the MONO Q columns

PARAMETER	HRLC MA7P	MONO Q
Speed of separation	1-10 minutes	5-40 minutes
pH stability	2-12	2-12
Pressure limit	2,500 psi (175 bar)	1,450 psi (100 bar)
Particle size	7 micron	10 micron
Eluted peak volume	0.10 ml	not reported
Kinetics	rapid (nonporous)	diffusion limited (porous)
Matrix type	polymer	polymer
Dimensions	4.6 X 30 mm	5.0 X 50 mm

- **Disposable cartridge design.** Compare the price of an HRLC MA7 cartridge with a conventional fast protein LC column. You'll be surprised by the difference. New technology allows Bio-Rad to offer these cartridges at a fraction of the cost of conventional columns.
- **Long cartridge life without a guard column.** Hundreds of injections per cartridge have been reported for several types of protein samples without the use of guard columns.
- **Individually tested cartridges.** Test chromatograms and standards are provided with each cartridge.
- **Complete HRLC MA7 Applications Kit.** The HRLC MA7 applications kit contains everything you need to start HRLC analysis in your lab today: two anion exchange cartridges, one cation exchange cartridge, HRLC-grade buffer, cartridge holder, protein standards, instructions, and an applications manual.
- **HRLC: the new generation in HPLC.** Our applications scientists can tailor a system to your needs. Available options include corrosion resistant construction, flow rates to 40 ml/min, operating pressures to 4,000 psi for your most demanding separations, and an IBM®-based controller and data system for rapid purification monitoring.

Contact us today for an in-depth evaluation of your protein analysis needs.

BIO-RAD

Chemical Division

1414 Harbour Way South
Richmond, CA 94804
(415) 232-7000
800-843-1412

Also in Rockville Centre, NY; Hornsby, Australia; Vienna, Austria; Mississauga, Canada; Watford, England; Munich, Germany; Hong Kong; Milan, Italy; Tokyo, Japan; Utrecht, The Netherlands; and Glattbrugg, Switzerland.

Circle No. 95 on Readers' Service Card

It's the Chemistry that Counts.™

ries are given or suggested.

This listing can be recognized as exhaustive and complete; it clearly refers to 1972 technology, covering all its possible states. Had the drafters meant to cite the five categories merely as examples, they would—or should—have added "but not limited to" after the word "include".

The Soviet version of the treaty does not translate "include" by the most direct term, but uses instead the unambiguous *otnosyatsya*, which means "refers to." In the absence of a qualifier, such as "among others," there is no question that the Soviet version covers only 1972 technologies.

S. FRED SINGER
1600 South Eads Street,
Arlington, VA 22202

Monitoring of Atmospheric Ozone

Richard Kerr (Research News, 10 July, p. 131) states that the Dobson spectrometer was not designed for trend monitoring and that there are problems with its maintenance and calibration. We agree (*1*) and believe that cross-referencing data from the Solar Backscatter Ultraviolet instrument with Dobson data must be inconclusive because both systems are subject to drifts of similar magnitude.

Dobson instruments are calibrated against a particular Dobson spectrometer chosen as a reference. The procedure is vulnerable because the reference instrument is also subject to drift and because changes occur during transportation. The precision of Dobson measurements is not readily calculable from instrument characteristics; rather it is established empirically and with difficulty. Checks on performance are intricate, time consuming, and demand dedicated, trained personnel. In practice, the checks are often not adequate and major malfunctions can go undetected, sometimes for years. The Dobson data include a high proportion of empirical zenith sky readings that are unsuitable for long-term trend studies.

The Automated Brewer spectrometer (*2*), unmentioned in Kerr's article, was designed in the early 1980s specifically for monitoring and has numerous fundamental and operational advantages over the Dobson instrument. The sun-tracking feature enables the Brewer to record a large number of direct sun observations and thus to avoid the zenith sky problem. Experimental evaluations of the measurement uncertainty, which are from two to three times smaller than those of the Dobson, confirm the values calculated from the instrument design. Brewer ozone measurements are not affected by sulfur dioxide and do not show dependence on the solar elevation. Instrument checks and self-characterizing procedures are programmed into routine operation of the Brewer, and the results are analyzed automatically. Consequently, malfunctions can be detected and rectified promptly.

The Brewer reference triad, to which the network Brewers are normalized, comprises three reference Brewer spectrometers operating continuously at Toronto. Each of these is independently and absolutely calibrated and can be replaced at any time without significant impact on the reference system. The transfer of calibration to the network spectrometers is usually effected by means of another Brewer that acts as a traveling standard.

In order to obtain better ozone data and to save a significant amount of manpower, Canada has put Brewer spectrometers into operation at six monitoring stations; Dobson instruments in the Canadian system are scheduled for decommission after 3-year periods of parallel measurement. Brewer spectrometers are now located in 11 countries. We believe the Dobson system should be replaced by the Brewer system throughout the global network and in the NASA network for Stratospheric Change. Otherwise ozone trend monitoring will continue to be based on a set of instruments whose long-term stability is in doubt.

W. F. J. EVANS
J. B. KERR
D. I. WARDLE
Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, Canada M3H 5T4
A. J FORESTER
Dartside Consulting, 151 Yonge Boulevard, Toronto, Ontario, Canada M5M 3H3

REFERENCES

1. W. F. J. Evans *et al. Stratospheric Ozone Research in Canada: 1987* (AES internal report ARPX-87-2, Atmospheric Environment Service, Downsview, Ontario, November 1987).
2. J. B. Kerr, C. T. McElroy, D. I. Wardle, R. A. Olafson, W. F. J. Evans, in *Proceedings of the Quadrennial Ozone Symposium* (Reidel, Hingham, MA, 1984), pp. 396–401.

Mitochondrial DNA in Sperm

Roger Lewin's parenthetical explanation of why sperm do not as a rule contribute mitochondria to the zygote (Research News, 2 Oct., p. 24) is, I'm afraid, incorrect. Rather like a machine capable of generating more energy than it consumes, a sperm without a mitochondrion would be a most remarkable sperm indeed. The maternal inheritance of mitochondrial DNA in most eukaryotes is caused by exclusion of the sperm's mitochondria from the zygote at fertilization.

A. RICHARD PALMER
Department of Zoology, University of Alberta, Edmonton, Canada T6G 2E9

"Homology" Controversy

In relation to the controversy over the use of the term "homology" to express identity of sequences in proteins or nucleic acids, I found myself in agreement with the more classical biologists who protest that this word already has a precise meaning, and it is not being used in this sense by modern molecular biologists (Research News, 25 Sept., p. 1570). One wonders indeed what is wrong with "percent identity," since this is the obvious term to use. Is it perhaps too obvious or ordinary and an example of scientists' increasing reluctance to use simple words to convey their meaning and to coin noninformative new words or to arbitrarily redefine words already in use? Clearly science needs a precise, technical language that must be learned; but have we gone too far? The same problem applies to legal language and to that vast mass of deadening verbiage that emanates daily from one or another bureaucratic office. A recent *New York Times* article (*1*) began, "The Tower of Babel so annoyed the Almighty, the Bible tells us, that the Lord forced its builders to converse in a babble of mutually unintelligible languages. A glance at any of the thousands of scientific journals published these days is enough to tell the story; the titles alone are enough to sow confusion among all but a few initiates." We have indeed come a long way since Isaac Newton could write very clearly, "In the beginning of the Year 1666. . . . .I procured me a Triangular glass—Prisme to try therewith the celebrated Phaenomena of Colors" (*2*).

HAROLD K. KIMELBERG
Division of Neurosurgery, Albany Medical College of Union University, Albany, NY 12208

REFERENCES

1. M. W. Browne, *New York Times*, 6 January 1987, p. C20.
2. G. E. Christianson, *In the Presence of the Creator. Isaac Newton and His Times* (Free Press, New York, 1984), p. 92.

The sophisticated LC Gradient Pump with a simple controller

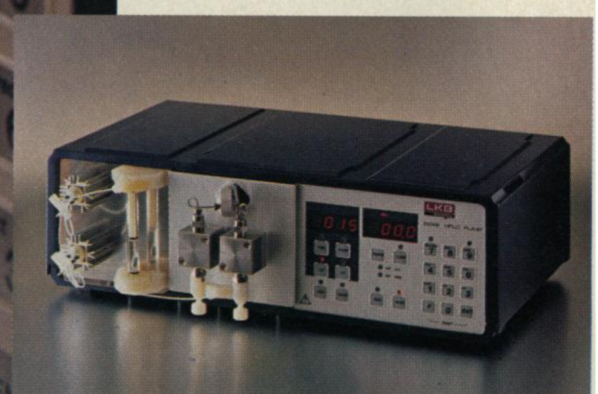
When it comes to routine gradient separations, it pays to focus on the essentials.

Why complicate programming with a variety of options that you'll never use? Why pay extra for a lot of whistles and bells? Why compromise features that really do make a difference in the accuracy and reproducibility of your results?

The new LC Gradient Pump combines all the best flow and mixing features together with self-contained binary or ternary gradient control to ensure quality results. There's no need for additional control components and their added costs.

With the new LC Gradient Pump you get all you really need and more, for a lot less.

Why not simply ask for a demonstration?



The 2249 LC Gradient Pump.

LKB

Pharmacia LKB Biotechnology AB, 751 82 Uppsala, Sweden, Tel. 018-16 30 00, Telex 760 70, Telefax 018-14 38 20.

LKB products: Box 305, S-161 26 Bromma, Sweden, Tel. 08-799 80 00, Telex 10492, Telefax 08-98 63 64.
Australia (02)888 36 22 • **Austria** (0222)69 16 01 0 • **Austria-Eastern European Countries** +43(222)92 16 07 • **Belgium** (02)242 4660
Canada (0514)684 88 81 • **Denmark** (02)26 52 00 • **Finland** (021)67 81 11 • **France** (01)64 46 36 36 • **Greece-Middle East** +30(1)894 73 96
Great Britain (0908)66 11 01 • **Holland** (034)80 77 911 **Hong Kong-Far East** (852)5-814 84 21 • **India** (0812)57 37 88 • **Italy** (02)253 913 21 • **Japan** (03)444-4811
Norway (02)54 90 95 • **People's Republic of China** (Beijing) 89 06 21 • **Sovjet Union** (095)255-6984 • **Spain** (03)230 05 01 • **Sweden** (08)799 80 00
Switzerland (01)821 18 16 • **United States** (0201)457 80 00 • **West Germany** (0761)490 30. Over 60 qualified representatives throughout the world.

Circle No. 69 on Readers' Service Card

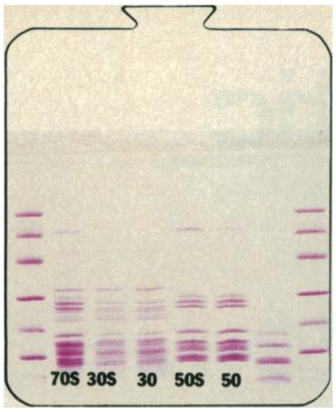
392


The care to meet
to know, to understand.
Ares-Serono Symposia is an independent foundation, created in 1971, to promote scientific research in all disciplines which contribute towards improving human health. This aim is pursued by means of congresses, courses, seminars and specialized studies.
Some of the international meetings scheduled for 1988 are:
5th European Workshop on the Molecular and Cellular Endocrinology of the Testis
Brighton, UK / April 13-16
Scientific Organization: B.A. Cooke (UK)
Endocrinology Under 35
Florence, Italy / May 23-25
Scientific Organization: M. Maggi (I) and C.J. Johnston (USA)
Platelets and Vascular Occlusion
Rome, Italy / June 1-3
Scientific Organization: G.A. FitzGerald (USA) and C. Patrono (I)
Advances in Biotechnology of Membrane Ion Transport
L'Aquila, Italy / September 19-20
Scientific Organization: R. Verna (I), P.L. Jörgensen (DK) and R.P. Garay (F)
Third Conference on Differentiation Therapy
Villasimius (CA), Sardinia/September 6-9
Scientific Organization: G.B. Rossi (I), F. Takaku (J) and S. Waxman (USA)
The Adrenal and Hypertension: From Cloning to Clinic
Tokyo, Japan / July 25-26
Scientific Organization: E.G. Biglieri (USA), J. Funder (AUS), F. Mantero (I) and R. Takeda (J)
No form of advertising or promotional activity by any pharmaceutical company is allowed at Ares-Serono Symposia Congresses.
ARES SERONO SYMPOSIA
Do you know all the advantages that the Ares-Serono Symposia Congress Card offers?
Please fill in this form and mail to Ares-Serono Symposia for information.
CONGRESS CARD 1988
ARES SERONO SYMPOSIA
swissair
Official Carrier
I would like to receive information about:
☐ Ares-Serono Symposia Congress Card
☐ All the above Congresses
☐ In particular the Congress on
☐ Ares-Serono Symposia Publications
Name
Address
Institution
Please send to Ares-Serono Symposia, Via Ravenna 8 - 00161 Rome - Italy
sintesi informazione - roma

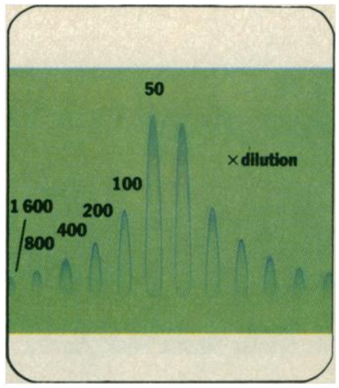
BANDS, ROCKETS, SPOTS, AND CURVES

LIFE

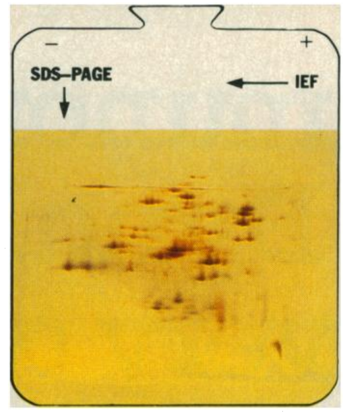
WHERE ALL SCIENCE BEGINS ·



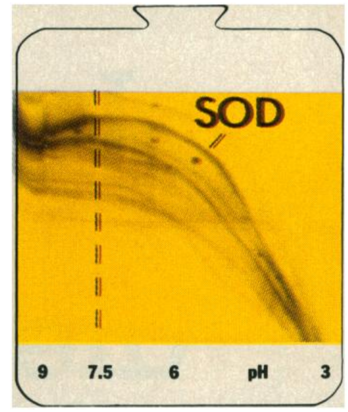
Analysis of *E. coli* ribosomal proteins by SDS–PAGE with subsequent coomassie staining. Sample to result: 60 min.



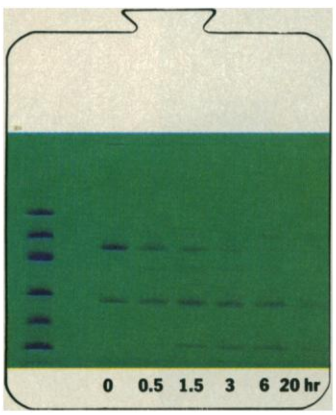
Analysis of human serum by immuno-electrophoresis with subsequent coomassie staining. Sample to result: 65 min.



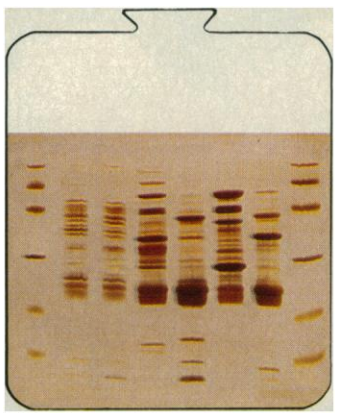
Analysis of *E. coli* proteins by 2D PAGE with subsequent silverstaining. Sample to result: 2.5 hr.



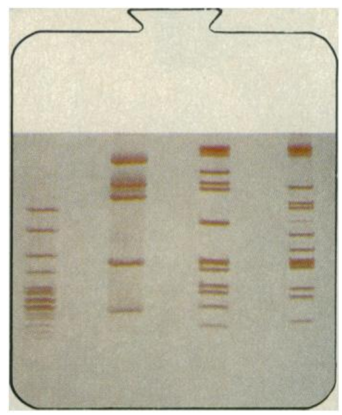
Characterization of a clarified cell homogenate by electrophoretic titration prior to purification. Sample to result: 90 min.



Optimizing a pepsin digest of Murine IgG Mab with SDS–PAGE. From sample to result: 60 min.



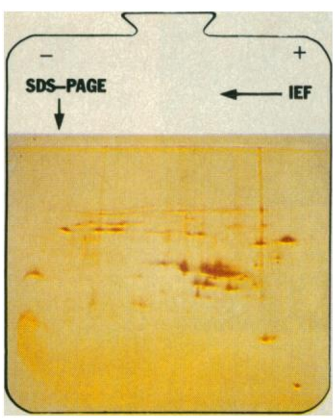
Analysis of peptides from an early step in the production of rH-growth hormones by SDS–PAGE. Sample to result: 90 min.



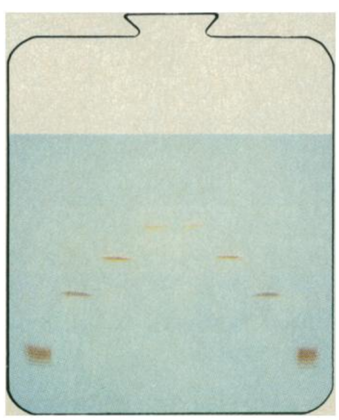
Analysis of DNA fragments from various digests by PAGE with subsequent silver staining detecting 75 pg. Range: 10 to 2 000 bp. Sample to result: 70 min.

Perform these separations in 20—60 minutes:

- **IEF**
- **2D PAGE**
- **Gradient PAGE**
- **Titration curves**
- **Homogeneous PAGE**
- **RIE and CIE**



2D analysis of a membrane protein fraction from Mycoplasma hyorhinis. Sample donated by K-E Johansson NVI, Uppsala, Sweden. Sample to result: 2.5 h.



Analysis of oligonucleotides synthesized on Gene Assembler ™ and purified on FPLC® (Pharmacia). With silver staining, results were obtained in 90 min.

All with PhastSystem™, the high-resolution electrophoresis system for incomparable speed and versatility in the modern laboratory.

When PhastSystem completes the separation under strict microprocessor control it develops the PhastGel™ separation media. With automation and high temperatures, PhastSystem has streamlined performance:

- **Silver staining in 60 min**
- **Coomassie staining in 30 min**

Regardless of your application, with Phast System you can use your time to concentrate on results—not on methods. Now you can quickly and easily analyze proteins, DNA fragments, peptides, and oligonucleotides on one system.

For real freedom of choice in separation and development, try PhastSystem.

For detailed information please contact Pharmacia.

Pharmacia products will be on display at ASCB - Booths 621, 623, 625

Circle No. 99 on Readers' Service Card

Pharmacia LKB Biotechnology Inc.
Piscataway, New Jersey 08854
Information: (800) 526-3618
In NJ: (201) 457-8000

Pharmacia