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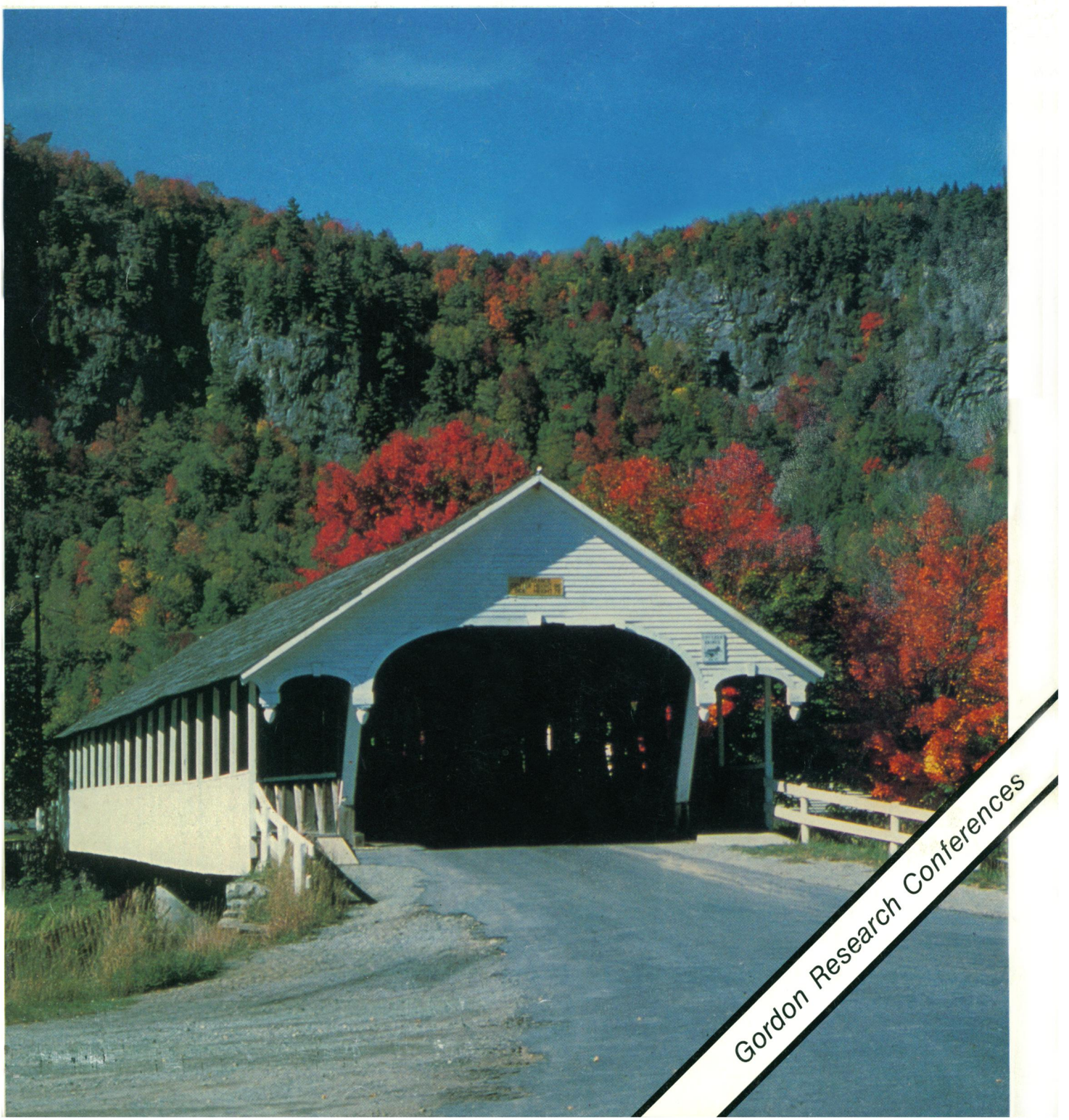

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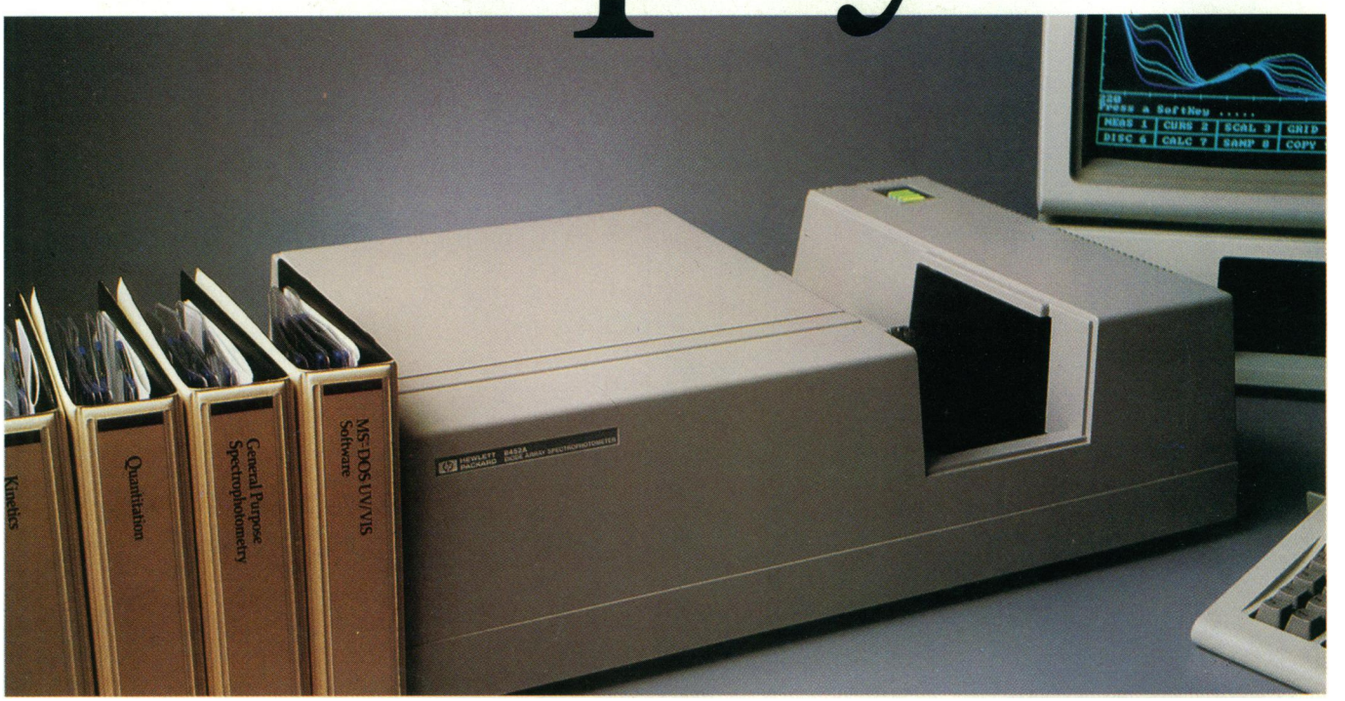

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1986 *FASEB* Summer Research Conferences

The Federation of American Societies for Experimental Biology presents Summer Research Conferences designed for analysis of research of intense scientific interest. The conferences in Saxtons River, Vermont and in Copper Mountain, Colorado, will be limited to 150 persons by invitation upon application. A conference fee of $300 covers one week's room, board and registration. For further details, see the February **Federation Proceedings** or call Robert W. Krauss, (301) 530-7093.

FOLIC ACID, B-12, AND ONE-CARBON METABOLISM **June 8-13** ***Vermont*** Chairs: Conrad Wagner, Vanderbilt University; Raymond L. Blakley, St. Jude Children's Research Hospital. **Enzymes.** R. Matthews, R. Blakley, H. Hogenkamp, C. Wagner; **Analyses.** C. Krumdieck, I. Eto, D. Priest; **Transport.** G. Henderson, F. Sirotnak, I. Rosenberg, C. Halsted, R. Allen, F. Kolhouse, R. Donaldson; **Metabolism.** E. Stokstad, J. Scott, J. Perry, J. Noronka; **Methyl Groups.** T. Tephly, J. Finkelstein, A. Macar; **Clinical Aspects of Deficiency.** I. Chanarin, D. Rosenblatt, R. Erbe, L. Rosenberg; **Folate Polyglutamates.** B. Shane, J. McGuire, R. MacKenzie; **Cancer.** L. Poirier, R. Hoffman, A. Feinberg, M. Wilson.

AUTOIMMUNITY **June 15-20** ***Vermont*** Chairs: Noel Rose, Johns Hopkins University; Alfred Steinberg, NIH. **T Cell Genetics.** G. Fatham, L. Glimcher, T. Mak, C. Terhorst, J. Berzofsky, P. Allen, A. Livingstone, J. Bluestone; **Lines and Clones.** H. Wekerle, I. Cohen, R. Nussenblatt, S. Zamvil, H. Weiner, H. McFarland, K. Weyand, D. Hafler, R. Hohfeld, F. Bottazzo; **Targets.** Y-C. Kong, W. Canonica, A. Like, A. McGregor, C. McAllister; **Manipulation.** N. Rose, J. Penhale, A. Hess, M. Iverson, Y-C. Kong, H. Weiner, S. Sakaguchi; **Hyperimmunity.** A. Steinberg, C. Reinisch, W. Davidson, Y. Rosenberg, A. Theophilopoulos; **History.** A. Silverstein; **Dysfunction and Retroviruses.** D. Cohen, A. Steinberg, I. Chen, M. Essex, A. Rabson; **Workshop and Posters.** E. Alexander.

MICRONUTRIENTS: RETINOIDS **June 22-27** ***Vermont*** Chairs: James A. Olson, Iowa State University; DeWitt S. Goodman, Columbia University. **Absorption, Metabolism, and Storage.** C. Ross, K. Norum, D. Knook, J. Olson, A. McCormick; **International Nutrition.** S. Srikantia, B. Underwood, F. Weber, A. Sommer; **Binding Proteins.** D. Goodman, P. Peterson, D. Ong, D. Soprano, J. Saari; **The Immune Response.** K. Nauss, G. Dennert, M. Malkovsky, R. Lotan; **Cellular Differentiation.** M. Sherman, P. Davies, E. Fuchs, H. DeLuca, L. Gudas; **Methodology: HPLC.** A. DeLeenheer, H. Furr; **GLC-Mass Spec.** A. Clifford, J. Napoli; **Synthesis.** F. Frickel, A. Barua; **Immunology.** D. Bok, R. Watson; **Molecular Biology.** V. Colantuoni, B. Laurent; **Nutritional Assessment.** D. McLaren, H. Flores; **Tissue Culture.** T. Breitman, A. Jetten; **Tumor Models.** R. Moon, U. Lichti; **Cancer.** G. Wolf, L. De Luca, B. Sani, Y. Muto, F. Meyskens, W. Bollag; **Carotenoids.** D. Sklan, N. Krinsky, M. Mathews-Roth, K-H. Lotthammer, I. Ascarelli; **Functions.** M. Griswold, D. Bridges, F. Chytil, M. Haddox, M. Maden.

MEMBRANES AND MEMBRANE TRANSPORT IN NEOPLASIA **June 29-July 4** ***Vermont*** Chairs: I. David Goldman, Medical College of Virginia; John Parker, University of North Carolina, Alan Paterson, University of Alberta. **Transport.** J. Parker, S. Grinstein, M. Hass, C. Deutsch, A. Finn, G. Lienhard, S. Jarvis; **Anion Transport.** R. Gunn, M. Jennings, R. Boucher, E. Hviid-Larsen; **Antifolate Transport.** D. Goldman, F. Sirotnak, G. Henderson; **Multi-Drug Resistance.** W. Beck, I. Pastan, J. Gonzalez-Ros; **Transport of Nucleosides and Bases.** C. Cass, R. Wohlhueter, J. Belt; **Membrane Transport and Therapeutics.** A. Paterson, C. White, D. Fry, J. Whiley; **Molecular Biology.** R. Kopito, J. Pouyssegur, J. Gargus; **Proliferative State.** I. Macara, P. Rosoff, M. Villereal, M. Saier.

SOMATIC CELL GENETICS **July 6-11** ***Vermont*** Chairs: Philip Coffino, University of California; David Housman, MIT. **Mutagenesis.** L. Chasin, D. Patterson, M. Callas, D. Garfinkel; **Receptors.** O. Rosen, R. Stanley, M. Greene, R. Evans; **Cell Cycle.** P. Coffino, A. Varshavsky, B. Schimke, D. Schumperli; **Plants.** R. Fraley, D. Bisaro, J. Nasrallah, H. Klee, N-H. Chua; **Tissue-Specific Expression.** W. Rutter, S. Tilghman, R. Grosschedl, C. Parker; **Human Disease.** D. Housman, K. Davies, S. Latt; **Differentiation.** M. Weiss, K. Fournier, H. Blau, B. DeCrombrugghe; **Amplification.** G. Wahl, J. Hamlin, G. Walker, R. Kucherlapati; **Oncogenes.** M. Wigler, D. Hanahan, E. Gateff.

TRICHOTHECENE MYCOTOXICOSIS **July 6-11** ***Colorado*** Chairs: Paul M. Newberne, MIT; Fun Sun Chu, University of Wisconsin. **Mycotoxins.** Y. Ueno, P. Nelson, B. Schiefer, W. Marasas; **Detection.** C. Mirocha, R. Eppley, F. Chu, J. Hewetson; **Chemistry and Synthesis.** B. Jarvis, C. Tamms, W. Roush, G. Kraus; **Pathology.** A. Rogers, W. Haschek, J. Johnson, W. Carlton; **Toxicology.** W. Buck, G. Feuerstein, T. Woods, C. Hassler, V. Beasley; **Inhalation/Dermal.** R. Wannemacher, D. Cresia, B. Kamppainen, R. Lambert; **Metabolism.** J. Pace, S. Swanson, W. Busby, M. Marletta, C. McLaughlin, D. Prelusky; **Intervention/Therapy.** D. Bunner, R. Fricke, A. Rogers, H. Nagasawa; **Hematology/Immunology.** P. Newberne, T. Cosgriff, P. Gentry; **Summary.** G. Feuerstein, A. Rogers, C. McLaughlin, T. Woods, W. Buck, D. Bunner.

DIETARY FIBER **July 13-18** ***Vermont*** Chairs: John A. Story, Purdue University; David Kritchevsky, Wistar Institute. **Analyses and Function.** D. Southgate, P. Van Soest, N-G. Asp, E. Bright-See; **Bacterial Digestion.** P. Van Soest, A. Salyers, G. Macfarlane, M. Eastwood; **Intestinal Function.** M. Eastwood, N. Read, S. Fleming; **Mucosa.** G. Vahouny, L. Jacobs, M. Cassidy; **Metabolism: Serum Lipids.** D. Kritchevsky, B. Schneeman, R. Kay, J. Anderson. **Bile Acids.** J. Story, M. Eastwood, K. Heaton, M. Hill; **Carbohydrates.** K. Heaton, D. Jenkins, J. Anderson, A. Leeds; **Digestion and Absorption of Other Nutrients.** B. Schneeman, G. Vahouny, D. Gordon, J. Kelsay; **Dietary Fiber in Food Supply.** H. Hurt, J. Vanderveen, C. Bonfield, J. Mullen.

CELLULAR AND MOLECULAR NEUROBIOLOGY: SYNAPTIC MOLECULES **July 13-18** ***Colorado*** Chairs: Darwin K. Berg, University of California; U. Jack McMahan, Stanford. **Ion Channels.** R. Hartshorne, I. Levitan, N. Gilula; **Neurotransmitters/Neuropeptides.** E. Herbert, R. Scheller, D. Chikaraishi; **Presynaptic Elements.** T. Reese. P. Greengard; **Synaptic Cleft.** R. Kelly, J. McMahan, P. Taylor; **Neurotransmitter Receptors.** J. Patrick, H. Mohler, D. Berg; **Postsynaptic Elements.** Z. Hall, M. Kennedy; **Transduction/Ion Pumps.** D. Baylor, C. Zuker, D. Fambrough; **Synaptic Formation/Development.** G. Fishbach, L. Reichardt, D. Anderson; **Synaptic Specificity.** L. Landmesser, E. Frank, B. Cunningham.

RECOMBINATION AND GENOME REARRANGEMENT **July 20-25** ***Vermont*** Chairs: R. Michael Liskay, Yale University; Gerald R. Smith, Fred Hutchinson Cancer Research Center. **Analysis of Homologs.** R. Esposito, J. Clark, J-L. Rossignol, A. Carpenter; **Site-Specific Recombination.** M. Simon, M. Cox, R. Hoess, A. Landy, N. Grindley; **Early Recombination.** W. Holloman, C. Radding, G. Smith; **Recombination of Incoming DNA.** M. Capecchi, R. Gregg, H. Smith, S. Goff; **Mammalian Systems.** J. Wilson, M. Siedman, R. Kucherlapati; **Workshop: Molecular Aspects.** P. Hastings; **Interactions of Repeated DNA Sequences.** H. Klein, T. Petes, S. Roeder, J. Roth; **Rearrangements.** J. Strathern, M. So, F. Alt, H. Eisen; **Transposable Sequences.** K. Mizuuchi, N. Kleckner, J. Boeke, D. Rio; **Processing Intermediates.** R. Weisberg, B. DeMassey, R. Kolodner, S. West, P. Modrich.

PHYSIOLOGY AND PATHOPHYSIOLOGY OF THE SPLANCHNIC CIRCULATION **July 20-25** ***Colorado*** Chairs: Dr. Neil Granger, University of South Alabama; Alan P. Shepherd, University of Texas. **Microvascular Organization and Blood Flow.** A. Shephers, B. Gannon, G. Bohlen, K. Proctor, I. Beck, L. Maxwell, L. Cheung, A. Sonnenberg, F. Leung, A. Shepherd, N. Sato; **Intestinal Blood Flow.** C. Chou, H. Granger, L. Rowell, A. Premen, D. Edelstone; **Salivary, Pancreatic, and Hepatic Blood Flows.** C. Goresky, L. Smaje, W. Lautt, A. Koo, S. Gelman, R. McCusky, P. Kvietys; **Microvascular Exchanges.** A. Taylor, R. Gore, H. Wayland, P. Tso, N. Mortillaro, J. Barrowman, N. Granger; **Intestinal Ischemia.** E. Jacobson, O. Lundgren, U. Haglund, D. Parks, G. Bulkley, S. Boley, M. Leblanc; **Gastric Circulation and Ulcerogenesis.** M. Perry, L. Holm-Rutili, L. Cheung, B. Whittle, P. Guth, N. Sato; **Hypertension and GI Bleeding.** R. Groszmann, M. Huet, A. Blei, H. Bosch, D. Leblec, R. Gusberg; **Pathophysiology.** R. Wechsler, K. Dinda, R. Zipser, M. Hollwarth, R. Korthuis, G. Meininger.

LUNG PHARMACOLOGY AND PATHOPHYSIOLOGY **July 27-August 1** ***Vermont*** Chairs: Norman Gillis, Yale University; Michael Boyd, NIH. **Perspectives.** J. Vane, R. Effros, L. Reid, J. Bend; **Lung Cells.** J. Last, C. Plopper, J. Finkelstein, U. Ryan; **Microcirculatory Regulation.** J. Bevan, C. Dawson, P. Kadowitz, J. Douglas, M. Peach; **Metabolic/Pharmacokinetic Lung Functions-Endogenous Substrates.** N. Gillis, P. Piper, J. Ryan, B. Pitt, L. Smith; **Xenobiotics.** T. Gram, P. Guengerich, L. Marnett, A. Buckpitt, J. Baron; **Drug Toxicity.** H. Witchi, M. Evans, H. Forman, K. Reiser, R. Roth; **Acute Injury.** K. Brigham, J. Evans, N. Voelkel, J. Catravas, L. Frank; **Pharmacotherapy of Lung Cancer.** M. Boyd, P. Nettesheim, R. Shoemaker, M. Johnston; **Newer Approaches.** D. Ranney, A. Jobe, B. Freeman.

RESPONSES TO GRAVITY AND SPACE WEIGHTLESSNESS **July 27-August 1** ***Colorado*** Chairs: Thora W. Halstead, NASA; Muriel D. Ross, University of Michigan. **Biophysics.** R. Naumann, C. Bugg, P. Todd, A. Cogoli; **Evolution and Cilia.** L. Margulis, R. Guerrero, P. Verdugo, H. Planel; **Calcium and Transduction.** R. Kretsinger, A. Means, J. Farley, F. Sachs; **Development.** A. Krikorian, P. Hepler, R. Quatrano, G. Malacinski, J. Alberts; **Sensors.** M. Ross, M. Wiedehold, C. Leopold, B. Pickard; **Biomineralization.** S. Weiner, D. Marme, C. Arnaud, D. Osborne; **Hormonal & Neural Responses.** W. Ganong, J. Horowitz, T. Scott, R Bandurski; **Organ Responses.** G. Bloomqvist, M. Tischler, E. Holton, M. Wilkins; **Summary and the Future.**

IMMUNOPHARMACOLOGY **August 3-8** ***Vermont*** Chairs: Anthony C. Allison, Syntex Research; Timothy J. Sullivan, Southwestern University. **T Lymphocyte Receptors and Activation.** J. Strobo, S. Tonegawa, A. Weiss, K. Kelley, G. Crabtree; **Interleukin-2.** A. de Weck, R. Robb, W. Greene, K. Kato; **B Lymphocyte Activation.** S. Tonegawa, W. Paul, T. Kishimoto, F. Lee, K. Ishizaka, D. Katz; **Interleukin-1.** P. Davies, S. Gillis, P. Lomedico, E. Eugui, A. Allison, J. Schmidt; **Vaccine Production by Recombinant DNA Technology.** A. Allison, K. Murray, H. Chan, L. Lasky, J. Young; **In Vivo Immunoregulation by Antibodies.** H. McDevitt, D. Wofsy, E. Reinherz, L. Steinman; **Cloned Effector Molecules.** D. Godel, S. Pestka, J. Ihle, C. Sherr, S. Clark; **Mediators of Inflammation.** T. Sullivan, H. Muller-Eberhard, H. Colten, L. Johnson; **Cloned Molecules in the Clinic.** A. Rosenthal, S. Rosenberg, E. Borden, T. Merigan, J. Gutterman.

RECEPTORS **August 10-15** ***Vermont*** Chairs: Henry Metzger, NIH; Rick Klausner, NIH. **Membrane, Protein Structure and Interactions.** H. Metzger, M. Crumpton, W. Webb; **Receptors as Kinases.** S. Cohen, J. Brugge, O. Rosen; **Signal Transduction via cAMP.** A. Levitzki, M. Caron, A. Danchin, M. Wigler, M. Smigel; **Regulation.** R. Lefkowtiz, M. Czech, M. Chabre; **Signal Transduction via Turnover of Phosphatidylinositol.** M. Beaven, J. Putney, S. Joseph, T. Connolly; **Olfaction.** S. Snyder, D. Lancet, F. Margolis; **Regulation at the Biosynthetic/Genetic Level.** R. Klausner, B. O'Malley, J. Harford, I. Pastan; **General Speaker.** M. Brown; **Receptor Trafficking, Sorting, and Cytoskeletal Interactions.** I. Mellman, D. Holowka, B. Baird, K. Mostov.

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COVER Covered bridge, Stark, New Hampshire. See page 1163 for details about the Gordon Research Conferences. [Photo courtesy of State of New Hampshire, Department of Resources and Economic Development, Office of Vacation Travel, Concord, NH 03301]

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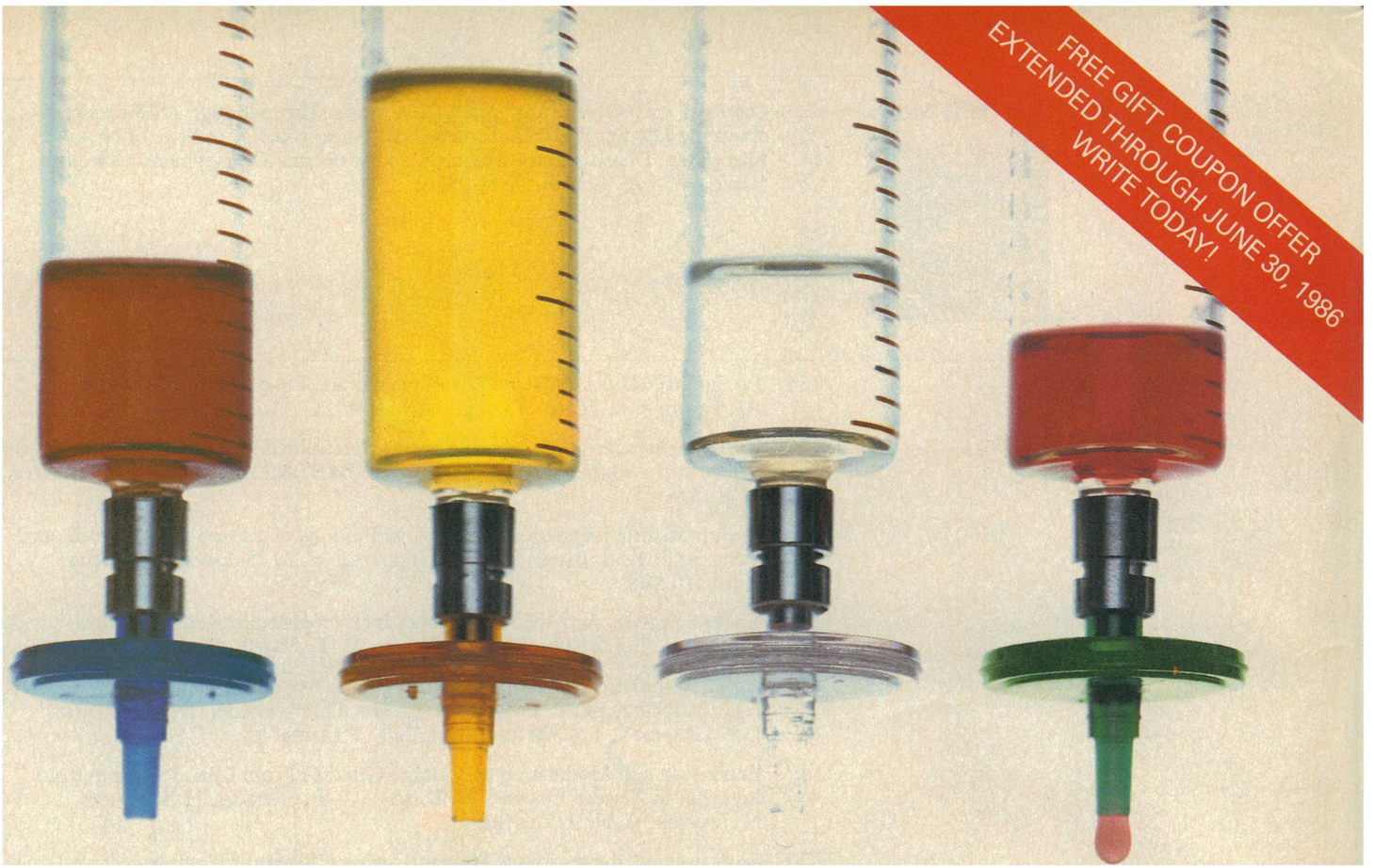

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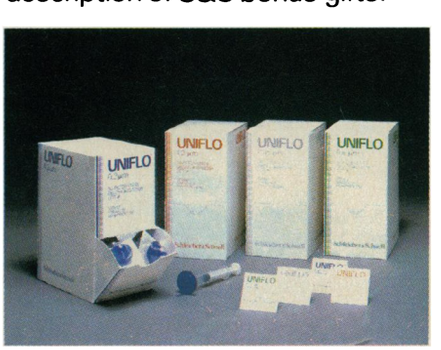

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Zeolite cages

ZEOLITES are catalysts, ion exchangers, and molecular sieves (page 1093). At a molecular level, their structures are cage-like. Natural mineral zeolites were discovered in cavities of volcanic rocks, in metamorphic rocks, and in sedimentary deposits; other zeolites have been synthesized and modified to enhance their usefulness. Catalysis (such as the catalytic cracking of crude oil to petroleum products) is promoted on internal surfaces of the cage; after heating releases water inside the cage, space becomes available for organic and inorganic molecules and metal vapors to interact with each other and other reactants. Molecular sieving depends on the size of the pores in the cage framework, because this controls what size molecules can pass in and out. Ion exchange takes place between cationic species in solution and those associated with the cage's anionic framework. Each use can be modified by the others: catalysis and separations can be made more efficient by substitutions of cations into the structure and by alterations of the sizes of the pores. Newsam describes the range of applications of zeolites, the details of zeolite structures, and what lies ahead (for example, interactive computer graphics that will show what molecules can enter the cages and what changes can take place inside) in the use and analysis of these versatile inorganic materials.

Sources of atmospheric mercury

MERCURY enters the atmosphere as a result of activities of some of the simplest organisms (phytoplankton) and some of the most complex ones (humans) in the food web (page 1131). Kim and Fitzgerald report on mercury dynamics in the equatorial Pacific region. In water, where upwelling provides an environment conducive to biological productivity, phytoplankton may, through metabolic activities, volatilize dissolved mercury. The Pacific equatorial phytoplankton or associated microorganisms may be responsible for 4 percent of the mercury that enters the atmosphere yearly. Extrapolated to global oceanic biological productivity, this could be an annual contribution of 36 percent of atmospheric mercury influx and be comparable to the amount of mercury that escapes into the atmosphere from human-generated sources.

Assembling immunoglobulin genes

A good candidate for one of the enzymes instrumental in assembling pieces of chromosomal DNA into genes for immunoglobulins (Ig's) has been identified (page 1141). The process of Ig-gene assembly requires orienting of pieces of DNA to be joined, cutting of DNA by an enzyme with endonuclease activity, and joining of cut pieces into the correct configuration. Hope *et al.* found an endonuclease activity in extracts of nuclei from chick embryo bursa and mouse fetal liver, two tissues in which cells that engage in Ig synthesis first appear during development. The endonuclease cleaved Ig DNA at a specific dinucleotide pair in just those regions where gene recombination has been shown to occur. Cutting always took place at such pairs, although not all such pairs were cut; other structures in the region must, therefore, contribute to the specificity of the reaction.

Vent community depletes sulfide

SEA-FLOOR organisms living around hydrothermal vents in the Galápagos Rift, 2500 meters below the water's surface, rapidly deplete their marine environment of sulfur and oxygen spewed up from submarine springs (page 1139). Sulfides are considered to be the primary energy source for the vent organisms, which live in the darkness of the ocean bottom and do not engage in photosynthesis. Johnson *et al.* measured chemicals in the deep sea with an analyzer attached to the outside of the submersible research vessel *Alvin*. As water flowed through the detectors, concentrations of sulfide, oxygen (needed for sulfide oxidation), and silicate (a tracer indicating what fraction of the water is from vents) were recorded, and large differences were detected in neighboring but distinct areas. Water from clumps of mussels and attached macro- and microorganisms had lower sulfide and oxygen concentrations than expected, and water samples from regions with the highest animal density were almost completely depleted of sulfides. The large differences over the short distances could only be attributed to the influence of the vent community on the local environment and specifically to its metabolism of sulfide. Other features of the chemistry of the deep sea can be probed with the new scanner.

Estrogen receptor structure

ESTROGEN, a steroid hormone, can induce gene expression by interacting with receptors in the nuclei of target cells (page 1150). While inactive, receptor and gene may be loosely associated; when estrogen binds to the receptor, a complex forms that activates genes by interacting with DNA and possibly with nuclear proteins. The structure of the estrogen receptor (ER) in human breast cancer cells has been determined by Greene *et al.* who used cloned DNA corresponding to the gene for ER to identify component nucleotides; from the nucleotides and from peptide sequences, the amino acid sequence of the receptor protein was deduced. Homologies were found when the sequence of ER was compared with sequences of human glucocorticoid receptor and of an oncogene protein. The most striking homology was in a cysteine-rich region, which may be responsible for the binding of these molecules, once complexed, to DNA. Structural studies will help establish which portions of ER bind to estrogen, which to DNA, and which affect other functions of the molecule. More may then be understood about how steroids affect gene expression normally and in tumor development.

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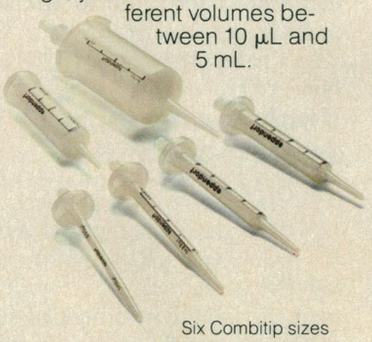

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SCIENCE

7 MARCH 1986
VOLUME 231
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Sources for New Scientists

Government reports can be hazardous to one's wakefulness. Many seem to consist of mountains of glittering generalities, interrupted only by murky and distantly related statistics. The recent Office of Technology Assessment report on scientific manpower* is an exception. It has real numbers that relate directly to the words in the text. For those of us who heard warnings only a few years ago that the United States was overproducing scientists, the report causes instant alertness.

The long-term demographic trends described point to a shortage of scientists. The peak in the 18- to 23-year-old age group of approximately 30 million occurred in 1982; there are expected to be 24 million in that age group in 1995. This could lead to a 12 to 16 percent decrease in college enrollment. The problem will be compounded if, as many believe, the future need for scientists becomes more acute. Since women and minorities are underrepresented among practicing scientists, it would be both advantageous for those groups and prudent for the country to consider ways to increase not only the number of young people entering college but also the ratio of those choosing science as a career.

Two model programs are addressing the need to expose disadvantaged youths to careers in science. One is Project Seed, sponsored by the American Chemical Society. This program, admirably stripped of bureaucratic red tape, allows chemists around the country to receive approximately $750 for the hiring of a disadvantaged high school student for a 10-week laboratory job. More then 200 students took part in this program last year and that number is growing steadily as foundations and private donors provide additional funds. A National Science Foundation program in the division of biological sciences allows professors to receive small grant supplements for the same purpose. This project, too, requires a minimum of red tape: since the scientist is already accredited by having received an NSF grant, only a brief request containing minimal information is required for a stipend similar in size to that of Project Seed.

These programs should be expanded in other agencies and with other sources of funds. Government agencies could well follow the NSF formula; private groups could pattern programs on Project Seed. Let us scientists not wait, however, but lead the way with good programs without red tape.

The opportunity to give disadvantaged students exposure to science in a friendly environment can be effective at an early and formative stage in their lives. My participation in a local disadvantaged youth program once resulted in the challenge of devising an appropriate summer program for a junior high school student in a working biochemistry laboratory. Many tasks necessary in a laboratory designed for graduate students become boring, but can be a revelation for a junior high student. Our young co-worker toiled diligently beside us throughout the summer, and everyone in the laboratory enjoyed recalling past excitement as we saw old chores through his eyes. At summer's end the student said, "Now I understand why one should work to get good grades in high school." These words have affected my thinking ever since, because many students from disadvantaged homes do not realize the importance of academic performance until it is too late.

Those who want to contribute to the current efforts can contact Project Seed at the American Chemical Society or the National Science Foundation. Often local organizations provide similar opportunities. Also, professionals with experience in this area say that the head of a laboratory can simply phone a local high school, speak with the principal or a guidance counselor, and select an appropriate student, even in the absence of a formal sponsoring organization.

The NSF and ACS projects are not the only programs of intervention occurring, nor are they a substitute for improved instruction in the public school system, but—for simplicity and effectiveness—they deserve encouragement. They can be implemented almost instantly without the need to work through large supervisory machinery. In an era of emphasis on "more bang for the buck," the output in this case could be a very big bang for some very small bucks.—DANIEL E. KOSHLAND, JR.

*Office of Technology Assessment, "Demographic trends in the science and engineering work force" (OTA-TM-SET-35, Government Printing Office, Washington, DC, December 1985).

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Calculations Zeilik presents to support his argument refuting the lunar markings are in error by factors of 2 or more, as well as being internally inconsistent. The shift of the average limiting position of the moonrise shadow edge after the major extreme is 2.6 centimeters in 2 years (not "1.5 cm") and 5.6 centimeters in 3 years (not "a little over 2 cm"). The correct values make the marking of the lunar cycle significantly more evident. The argument that the shadows are not "reliably marked" on the "weathered petroglyph" disregards that when the spirals were first made and used they were not weathered. Zeilik supports his proposal that a lunar marking was, instead, a mid-May solar marking by citing "important corn and bean planting" at the historic Hopi Pueblo. His reference (*2*), however, makes no mention of any particular planting time in mid-May, but stresses that planting was determined by season and weather. In describing "the gist" of our reports of the lunar markings (*3*), Zeilik describes incorrectly, or omits mention of, several key features of the site that underscore these markings and their symmetry.

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ROLF M. SINCLAIR
National Science Foundation, Washington, DC 20550

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3. A. Sofaer, R. M. Sinclair, L. E. Doggett, in *Archaeo-astronomy in the New World*, A. F. Aveni, Ed. (Cambridge Univ. Press, New York, 1982), pp. 169–181; A. Sofaer and R. M. Sinclair, in *Astronomy and Ceremony in the Prehistoric Southwest*, J. Carlson and W. J. Judge, Eds. (Maxwell Museum Technical Series, Univ. of New Mexico, Albuquerque, in press).

Response: Sofaer and Sinclair raise two main points, first, the usefulness of ethnographic analogy and, second, the visibility of the motion of the shadow edges cast by the moon.

A methodological framework for the use of analogy is where ethnographic data can "serve as resources for testing hypotheses which seek to relate material and behaviorial cultural phenomena" (*1*, p. 63). Pueblo sunwatching practices (*2*) show the importance of anticipatory observations. A conservative hypothesis is that anticipation was an important aspect of a Chacoan Anazasi calendar. This does not "equate" past and present, but forms a baseline for evaluating calendrical sites. Ellis (*3*) implicitly uses a similar approach in her analysis, while suggesting that practices may have been more elaborate in pre-Hispanic times.

As Sofaer and Sinclair correctly note, my calculation contained an error: their values are correct. This change makes the motions more evident, but they will amount to roughly a centimeter per year and only about a millimeter per month in the 2 years before the standstill. The visibility of such motions in moonlight and on a rough rock surface still limits the usefulness of the site for anticipating the standstills.

For Hopi planting dates, a more specific reference is a paper by Forde (*4*, p. 385 and figure 6), who indicates that the main corn planting occurred in the third week of May. This and other dates were announced ahead of time by the official Sunwatcher.

MICHAEL ZEILIK
Department of Physics and Astronomy, University of New Mexico, Albuquerque 87131

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International Congress Attendance

Roger Lewin's article "Archeology congress threatened" (News & Comment, 22 Nov., p. 921) expresses a misconception that I ask to be allowed to correct: that is the statement that the decision was "to deny attendance to anyone working in South African institutions." The ban is wider than what is represented in the article.

On receiving the circular letter sent to all scientists living in South Africa denying them participation in the so-called World Archaeological Congress, I wrote pointing out that I was born and educated in England, could travel on a British passport, and am not (nor ever have been) employed by any South African university or other institution, being a self-employed professional man and private scholar. The reply from the World Archaeological Congress states that I cannot participate while I am domiciled in South Africa.

May I add that I am appalled that scientists in England should deny fellow members of distinguished British scientific bodies such as the Royal Society, the Royal Anthropological Institute, and the Society of Antiquaries the right to attend an international congress in England, and this on solely political grounds.

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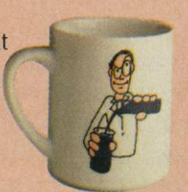

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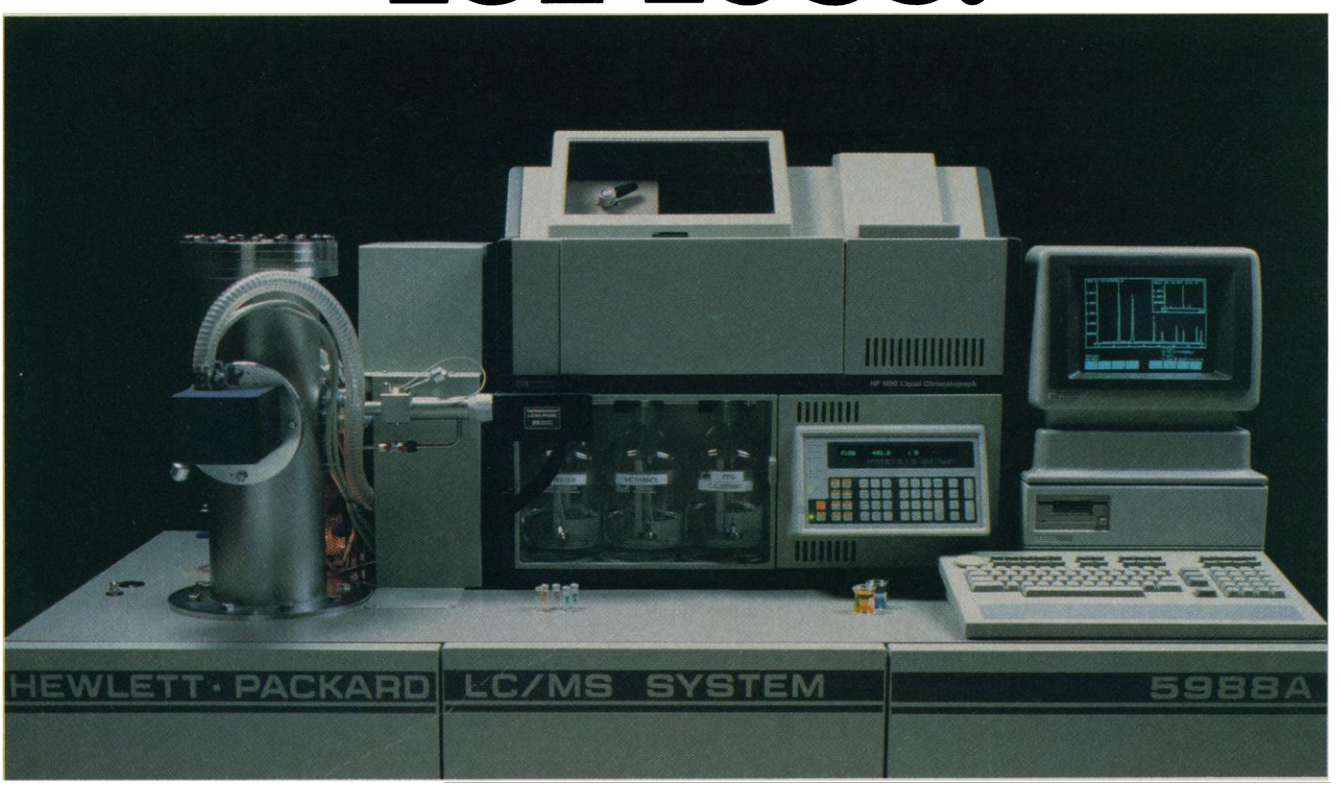

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BIOSYSTEMS UPDATE

A Progress Report on Technical

In less than five years Applied Biosystems has become the leading supplier of products used in the synthesis and analysis of nucleic acids and proteins. The wide acceptance of our products has made possible significantly greater investments in research and development. The benefits to our customers in terms of improvements to existing products have been dramatic. Less visible so far has been the development of several novel and important products. Here is a preview.

Automatic Derivatization and Analysis of Proteins, Peptides, Amino Acids, and other Biomolecules

A unique instrument-reagent system is being developed to extract and/or derivatize sequentially as many as 72 samples in a single loading. Each derivatized sample is transferred automatically to an integrated microanalytical liquid chromatograph for analysis. Several derivatization or extraction chemistries are possible and the manual steps required with current systems are completely eliminated.

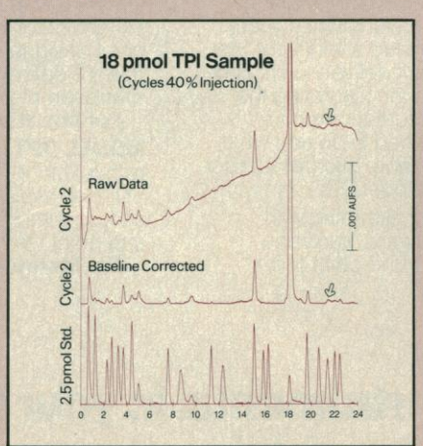
An optional module will be available to allow automatic hydrolysis of each sample prior to derivatization and analysis. Amino acid analysis, at higher levels of sensitivity and reproducibility than are currently possible, is the first of several applications of this new technology. A new data analysis system, described below, may be added to the system to automate procedures all the way through the presentation of processed data.

Optimizing Data Derived from the Analysis of Proteins, Peptides and Amino Acids

A new data system is being developed for the automated collection, analysis, storage and interpretation of chromatographic data from derivatized amino acids. It is designed to operate with, and to control, the Model 470A Protein Sequencer, the Model 120A PTH Analyzer and the derivatizer-analyzer described above.

When in control of the sequencer and the on-line PTH analyzer, the system uses familiar sequencing terminology to provide chromatogram displays, calculated yields and lags, and sequence reports. Though capable of extensive data processing, the system was designed to facilitate further processing by user programs on any IBM PC/DOS compatible computer.

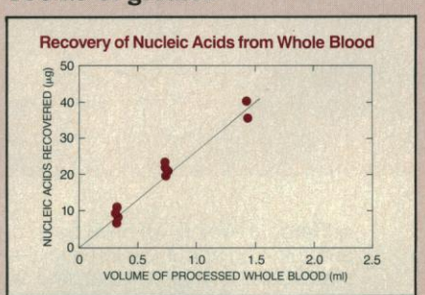
In the data below, background subtraction from chromatograms is demonstrated on Cycle 2 in the sequencing of an 18-pmol sample. Arrows show peaks about 200 fmol.

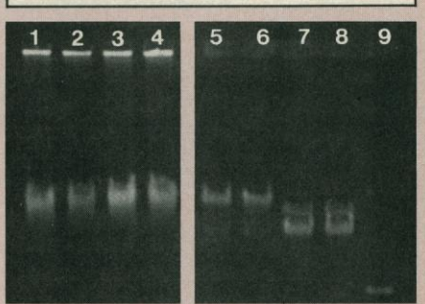


Automatic Extraction and Purification of Nucleic Acids

A novel instrument-reagent system is being developed which automatically extracts and purifies genomic DNA or RNA from tissue, bacteria and viruses. It uses carefully optimized procedures which include sample digestion, organic extractions, and a choice of either ethanol precipitation or dialysis. Up to eight distinct samples may be processed simultaneously in under 3½ hours using Applied Biosystems reagents, protocols and software. The system may be programmed also to automate user-developed methods.

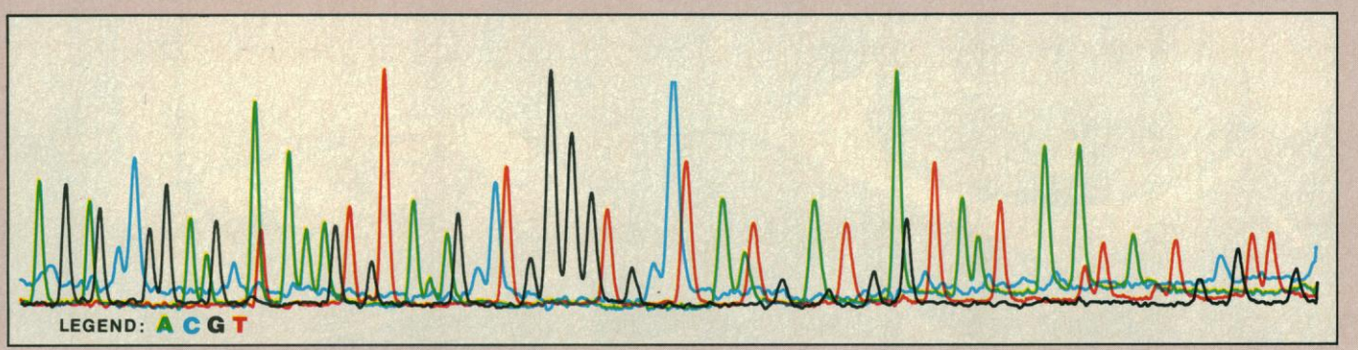
DNA, purified by the automated extractor, has been shown to be of high purity, high yield, and high molecular weight. The graph below demonstrates linear recovery of genomic DNA from differing amounts of human blood. A gel is also shown which demonstrates that isolated DNA is 160 kb or greater.





Lanes 1–4 DNA from human blood isolated with the extractor, **Lanes 5 & 6** T4 DNA (164 kb), **Lanes 7 & 8** Lambda phage DNA (50 kb), **Lane 9** EcoR1 digest of Lambda DNA (21 kb) (0.3% agarose gel).

Advancements and Future Products



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Shown above is a portion of a trace showing bases 120 through 190 of M13 mp8 DNA.

New Developments in DNA Synthesis Chemistry

New chemistries have been developed which allow the synthesis of fluorescent-labeled oligonucleotides directly on current Applied Biosystems DNA synthesizers. They are now being tested. New reagents to expand the applications of synthetic DNA are also being tested. They include, for example, precursors for linker attachment and new base analogues. More exciting however are new developments in methoxy- and beta-cyanoethyl phosphoramidite chemistries that are expected to reduce dramatically, and perhaps eliminate, the need for post-synthesizer purification.

New Developments in Peptide Synthesis Chemistry

An FMOC synthesis protocol will be available soon for use on the Applied Biosystems peptide synthesizer. This will be in addition to the BOC chemistry which is being improved further. In addition, new cleavage and deprotection methods are being developed to improve the yield of synthetic peptides and generally facilitate the procedure.

Progress at Applied Biosystems is a rapid process tempered only by our commitment to build quality and reliability into the tools we provide for biochemical research. These tools are not just instruments and reagents, but also the comprehensive service and product support activities that help ensure customer satisfaction. Many of the ideas for new products, improvements to existing ones, better service, and more complete product support, originate from our customers. We want to hear from you, wherever you may work. Our products, services and customer support activities are available worldwide.

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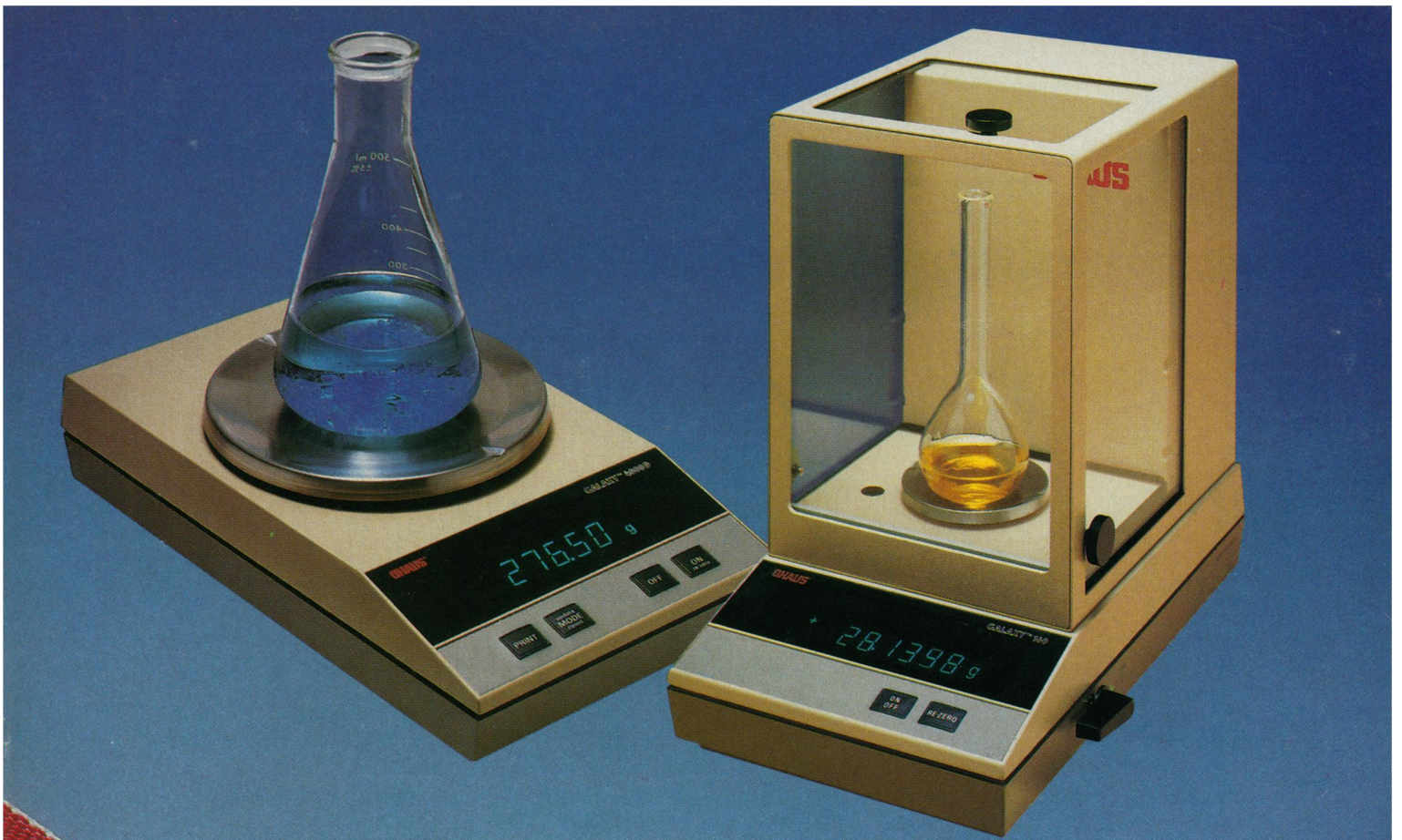

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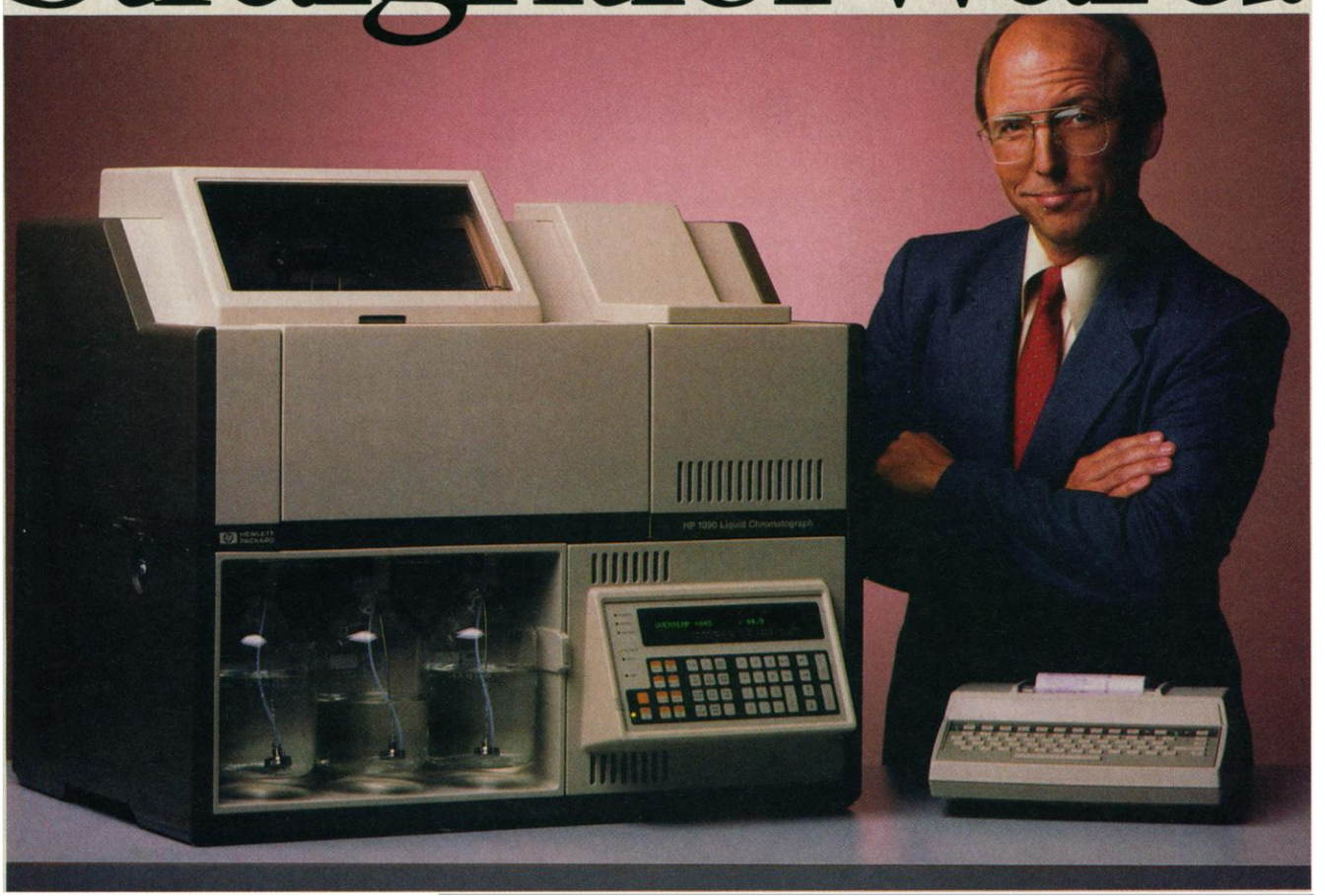

The HPLC system that's easy to use.

Like you perhaps, Sam looks for the most straightforward way to get results from his lab. He's finally found an HPLC system that anyone on his staff can use—without training. The HP 1090 Series L.

Everything is controlled from a single keyboard. And each of his systems is set up to run a variety of methods on 100 samples per shift, completely unattended. With full documentation of the results.

What's more, Sam's HP system provides a level of chromatographic performance you wouldn't expect from a system this easy to use. Or this economical.

Sam's particularly pleased with the performance of the new built-in diode-array detector, which gives him both the sensitivity and peak purity information he needs for his applications.

For data handling, he selected the new HP 3393A computing integrator. Its multilevel calibration and BASIC programming eliminate time-consuming manual calculations and improve his quantitative accuracy.

Whether your needs are as straightforward as Sam's or more complex, there's a Hewlett-Packard HPLC system to match your requirements. Exactly.

For more information, call the HP office listed in your white pages and ask for an analytical product representative. Or write Hewlett-Packard Analytical Group, 1820 Embarcadero Road, Palo Alto, CA 94303.

See us at the Pittsburgh Conference.

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AG04513

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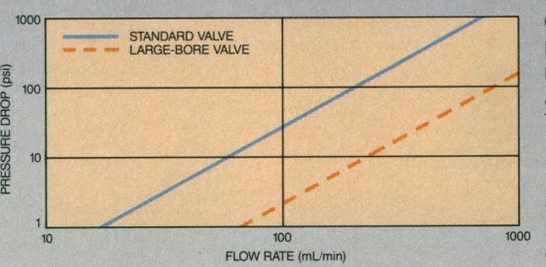
The Power of 4.

It can determine which Rheodyne LC valve you need.

Operating within the flow passages of every LC valve is a powerful exponential term, D^4, passage diameter raised to the power of 4. A little knowledge of D^4 can help you choose the best valve for your application.

Sample dispersion is proportional to D^4. So a small diameter provides high resolution. Good.



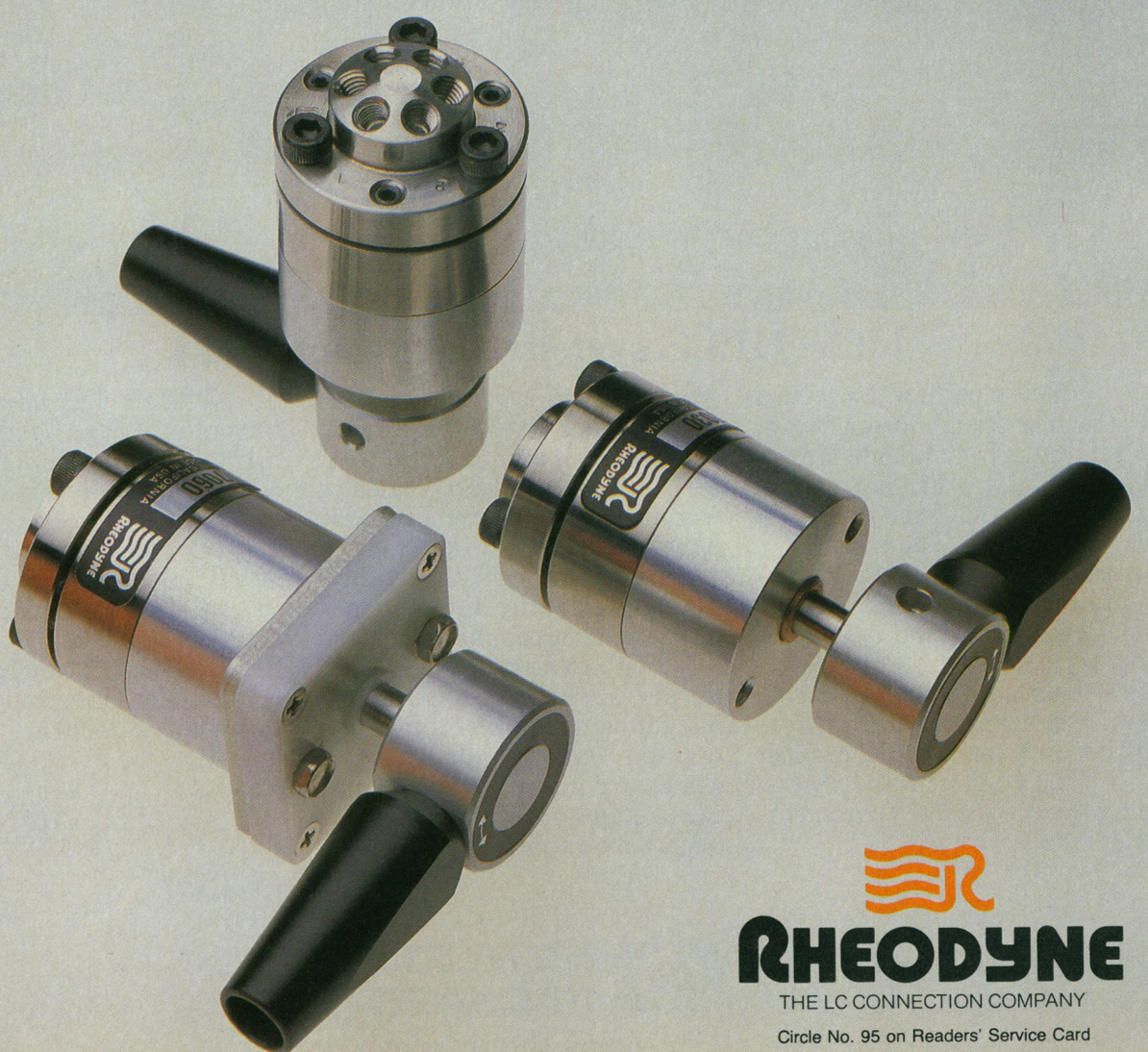
But loss of pressure due to flow resistance is *inversely* proportional to D^4. So a small diameter causes a large pressure drop. Not good.

In analytical LC small diameter passages cause only insignificant pressure drops, because flow rates are low.

But in preparative LC, small passages can cause excessive pressure drops. So for preparative work at flow rates above 100 mL/min, Rheodyne now manufactures a line of valves with larger passages. They cause only a tenth as much pressure drop as analytical valves.

Literature on the prep valves is available—along with a relevant and helpful technical note. Our Tech Note 7 explains the practical effect of passage diameter in injectors, valves, and connecting tubes—with the aid of graphs like the one above.

For literature, tech note, and an up-to-date catalog, phone your Rheodyne dealer. Or contact Rheodyne, Inc., P.O. Box 996, Cotati, California 94928, U.S.A. Phone (707) 664-9050.



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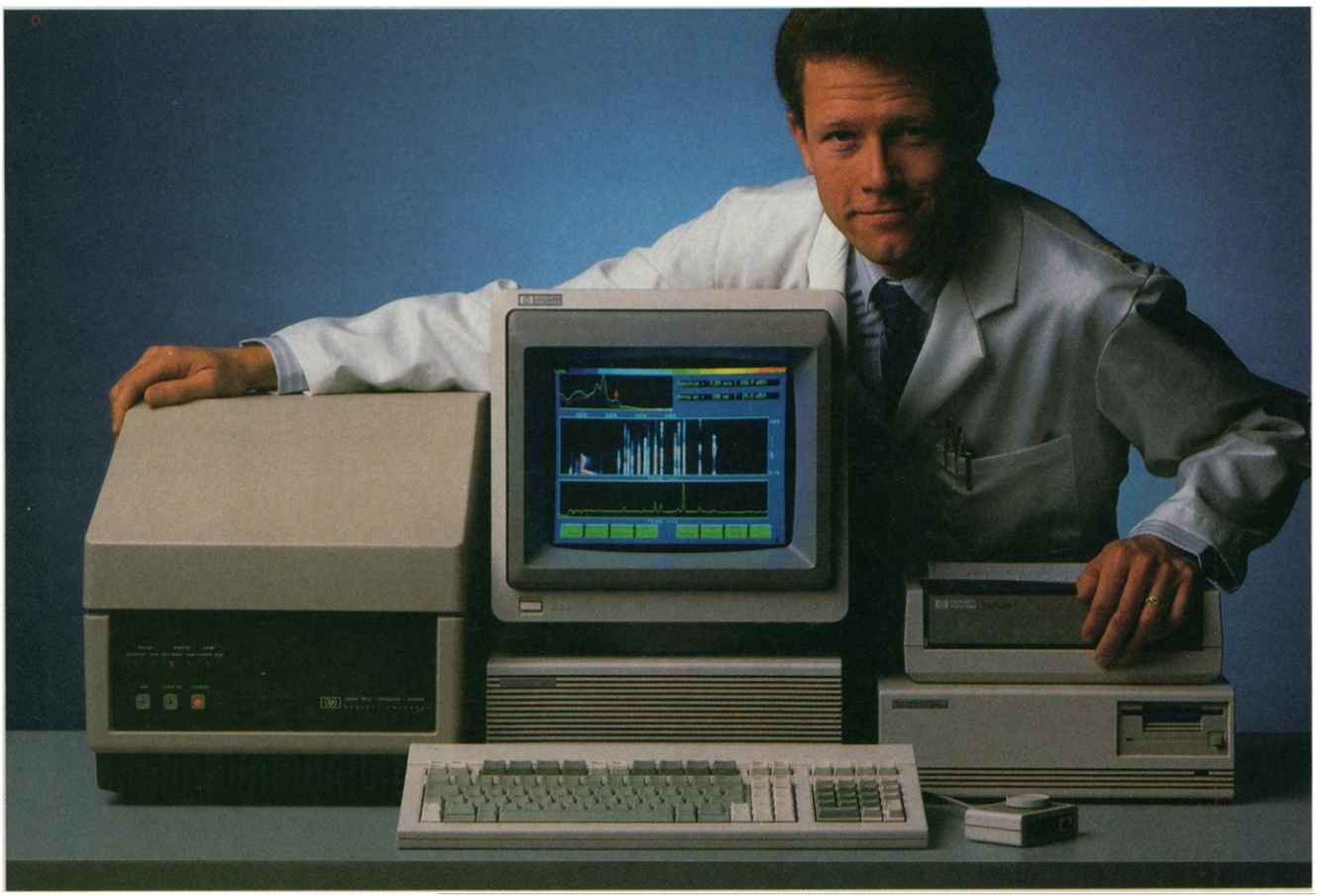
Resourceful.



The HPLC detection system for interactive problem-solving.

Maybe you're like Richard, who works in an analytical lab running samples for both R&D and manufacturing. Sometimes he has to be pretty resourceful.

Using equipment from a variety of manufacturers, Richard has configured each of his six HPLC systems for a special type of analysis.

For maximum confidence in his quantitative results, his HP 1040M diode-array detection system is an important part of his lab. And he can move it from one HPLC to another — wherever it's needed most.

This new detection system provides the sensitivity and qualitative information Richard requires for both his R&D and quality control work. It gives him the resources he needs to check suspicious peaks for purity and identity. Fast color graphics make it easy.

Interactive software allows him to store spectral data and evaluate it in a variety of ways without rerunning his samples — an invaluable feature, particularly when his time or sample is limited.

Whether your needs are similar to Richard's or very different, there's an HP system to match your requirements. Exactly.

For more information, call the HP office listed in your white pages and ask for an analytical product representative. Or write Hewlett-Packard Analytical Group, 1820 Embarcadero Road, Palo Alto, CA 94303.

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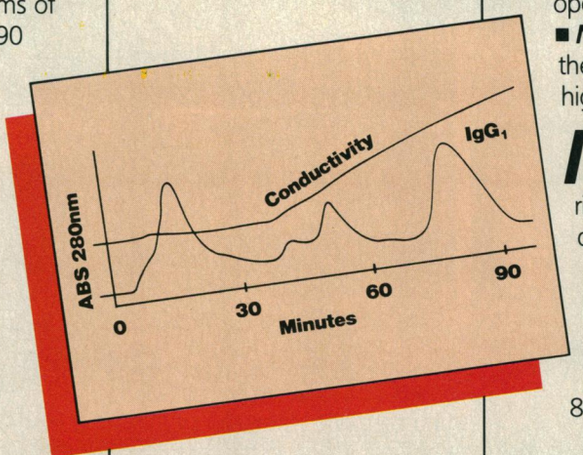
Bio-Rad's new MAPS™ Preparative System 100.

It isn't quite correct to call it a machine. But the System 100 does churn out a lot of work in a short time. Specifically, it can purify up to 0.5 grams of monoclonal antibody in under 90 minutes. That adds up to several grams per day.

The MAPS Preparative System 100 also offers these indispensable advantages:

- ***Universal technique,*** allowing separation of all antibody classes, including IgG, IgM and IgA!
- ***Quantitative recovery*** of antibody activity at high levels of purity.
- ***Easy scale-up,*** using small amounts of sample for preparative methods development.
- ***Automated system*** for easy operation and high reproducibility.
- ***Non-pyrogenic system*** for therapeutic applications requiring high purity antibody.



In addition, the System 100 comes complete with all materials needed for methods development.

We think it's the ideal system for the large scale purification of monoclonals. But find out for yourself. Call 800-4-BIORAD or contact:

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"a company is known by the people it keeps."

We've taken the liberty of reversing a well-known axiom to make a point about our toxicology laboratory. People make it work. And we've got a greater percentage of the best of them than anyone else. Nearly every one of our toxicology study directors is certified by the American Board of Toxicology, and is a member of the Society of Toxicology. Our studies (acute, subchronic or chronic) are directed by toxicologists experienced in interpreting the normal findings as well as unusual treatment-related effects. In addition, our pathologists are all board-certified or board-eligible, each having over a decade of experience. The majority of our technicians are also AALAS-certified, hold college degrees and have passed a vigorous in-house training program.

Turning the saying back to its original form, "people are known by the company they keep," there's another point to be made. That is, we not only encourage our people to gain certifications, but we keep them after they do.

People. A key ingredient to our success. And yours!

For information contact Dr. William J. Tierney, (201) 873-2550, P.O. Box 43, Mettlers Road, East Millstone, New Jersey 08873.

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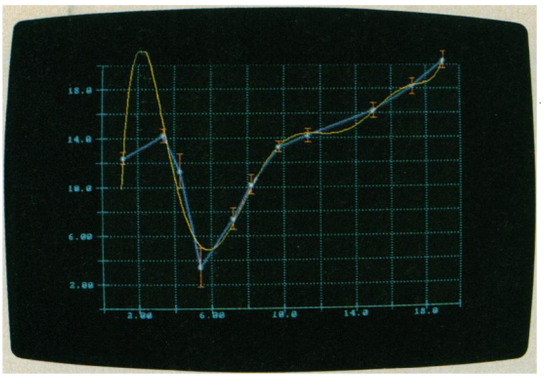
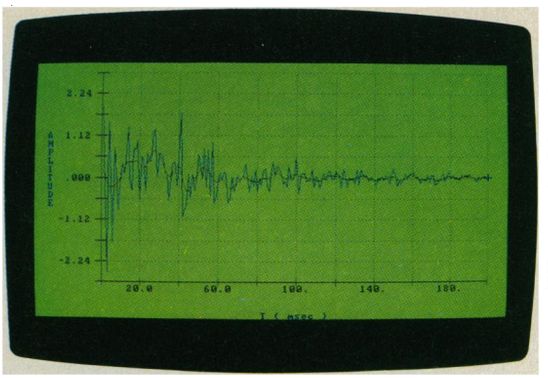
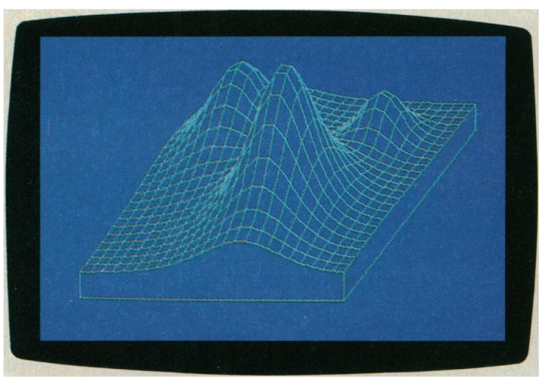


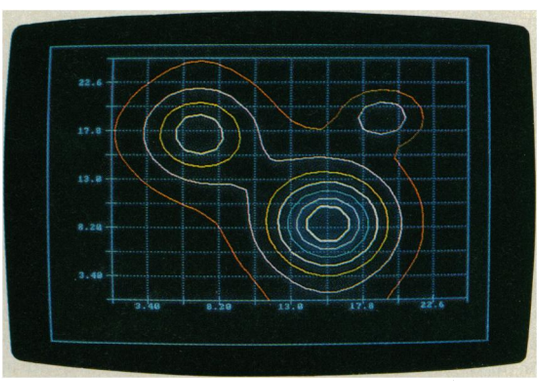
ASYST high-resolution graphics now include error bars, labels, axes, grids, and multiple colors.



New color graphics enhance comparison of experimental data with filtered data.



ASYST axonometric plots simplify analysis of complicated 3-dimensional surfaces.



Contour plotting adds an alternative approach to meaningful 3-D representation.

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ASYST™ Scientific Software turns your IBM PC, XT,™ AT, or compatible into a complete scientific workstation. And now it's even more versatile, with:

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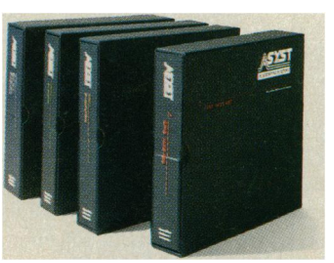

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Conducted in collaboration with the Office of Public Sector Programs, AAAS, Washington, DC, this conference will present timely information on the outlook for R&D funding in the current federal budget crisis. Advance registration is $80 (students, $50). For information, and registration and housing forms, contact: AAAS Pacific Division, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 (Telephone: 415/752-1554).

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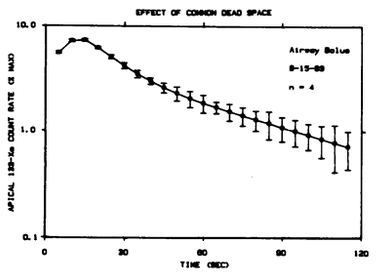

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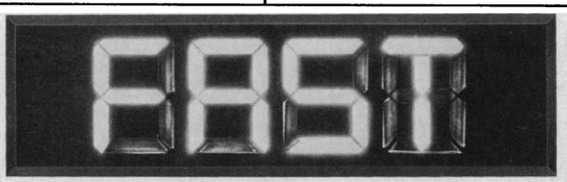

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