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COVER

South African cheetah cub (*Acinonyx jubatus*). The cheetah is the world's fastest mammal and the most morphologically specialized felid. The modern species appears to be striking in its biochemical genetic uniformity compared to other felids or mammals in general, possibly as a result of a severe population bottleneck or series of bottlenecks in its natural history. The consequences of this genetic monomorphism are readily apparent in captive cheetah, and the species provides a graphic biological example for the adaptive value of accumulated genetic variation in outbred mammalian species. See page 1428. [Jay Golden, Wildlife Safari, Winston, Oregon]

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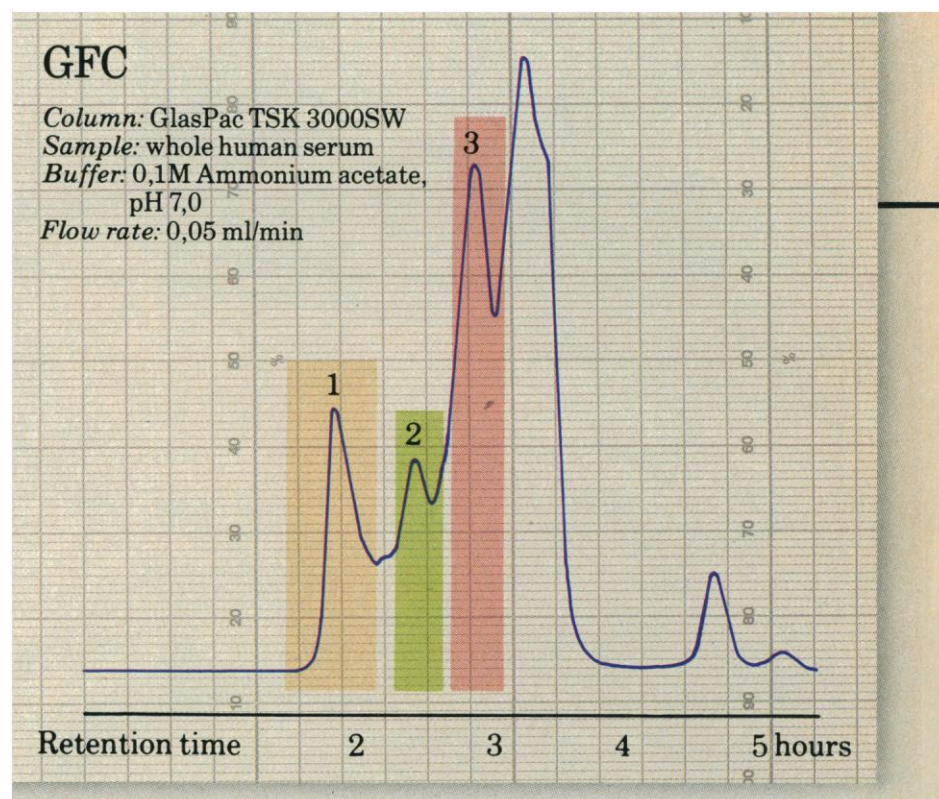
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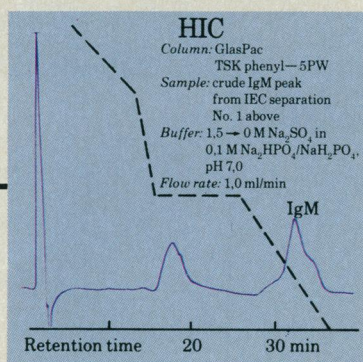
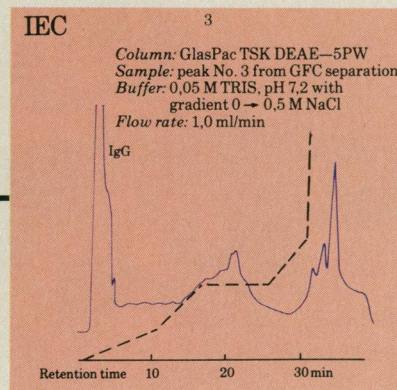
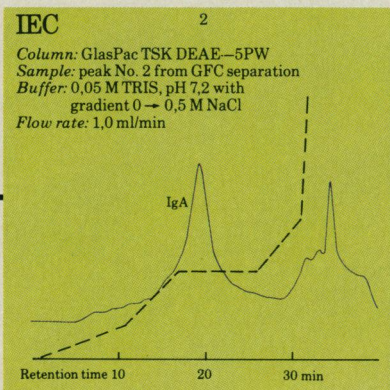
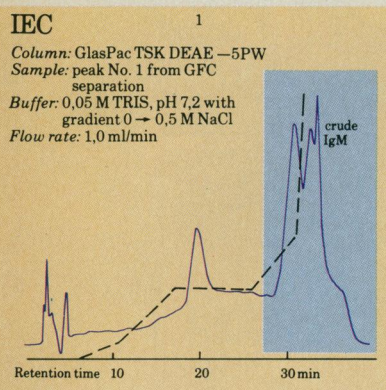
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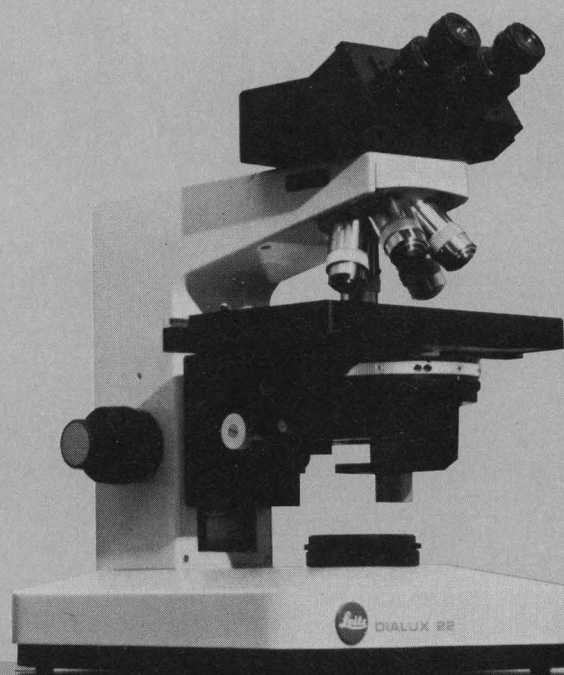
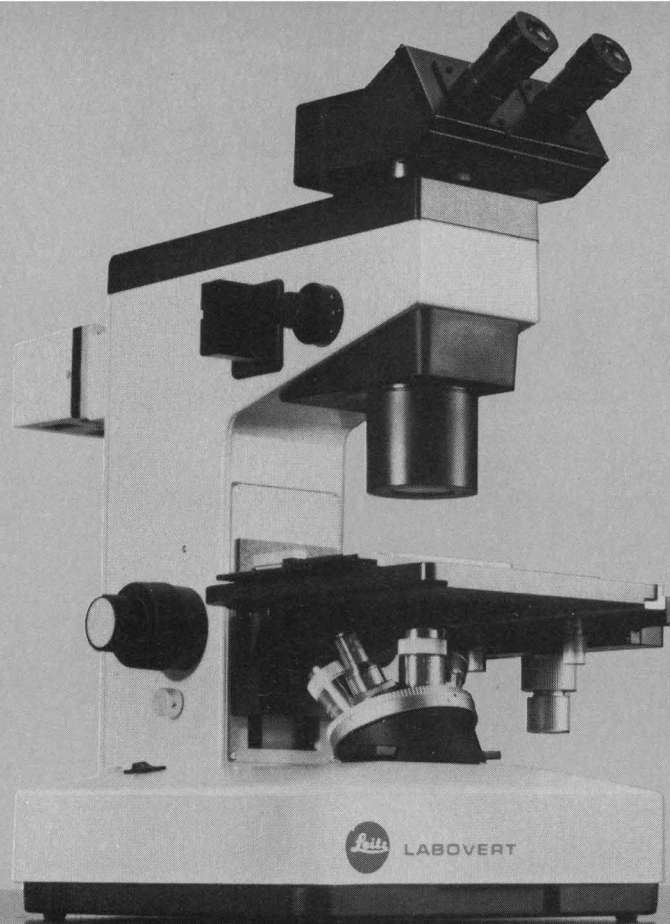


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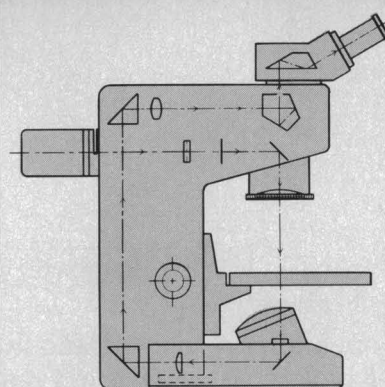
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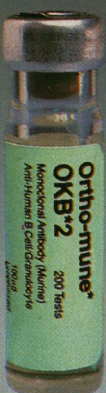
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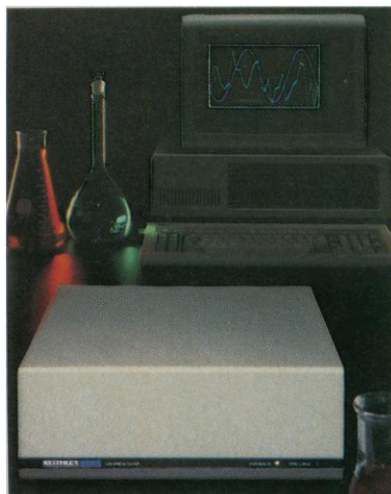
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Other I/O					
5 12-Bit Voltage Outputs	Yes	+\$187 ⁽⁹⁾	+\$937 ⁽¹⁰⁾	+\$937 ⁽¹⁰⁾	+\$2500 ⁽¹¹⁾
16 Digital Inputs	Yes	Yes	+\$175 ⁽¹²⁾	+\$330	+\$530
16 Digital Outputs	Yes	Yes	+\$175 ⁽¹²⁾	+\$350	+\$710
4 120VAC Outputs	Yes	No	No	+\$638 ⁽¹³⁾	+\$265 ⁽¹⁴⁾
System Features					
Programmable Timers	Yes	Yes	Yes	Yes	+\$555
Realtime Clock	Yes	Yes	Yes	Yes	Yes
Power Supply	Yes	+\$350	Yes	Yes	Yes
Software System					
Data Acquisition BASIC	Yes	Yes	Yes	Yes	No
Foreground/Background	Yes	No	Yes ⁽¹⁵⁾	Yes ⁽¹⁵⁾	No
Data Analysis	Yes	No	No	No	No
Realtime Graphing	Yes	Yes	Yes	Yes	No
Engineering Units	Yes	No	No	No	No
Package Price	\$4800	\$6387	\$7887	\$6277	\$9654

1. System 520. 2. 16 channels of \$725 32 channel card. 3. \$1640 A/D card plus 16 channels of \$580 20 channel card. 4. ± 0.003% accuracy @ 200 Hz. 5. ± 0.006% accuracy @ 40Hz. 6. Apple system 27 kHz, IBM system 31.4 kHz. 7. 200 kHz option available + \$3825. 8. Only available with 16-bit A/D converter with programmable gain preamplifier + \$1100. 9. 1 channel from \$750 4 channel card. 10. 5 channels from \$750 4 channel card. 11. 5 channels from \$1000 2 channel card. 12. 16 channels of \$350 32 channel card. 13. Price based on 16 channel rack @ \$550 plus 4 AC output relays @ \$22. 14. Four channels of \$525 8 channel card. 15. Or other multi-tasking structure.

channels of analog output, 160 channels of digital I/O, and AC/DC device control. With direct transducer connection and signal conditioning for each individual channel.

It's also the only system equipped with Soft500, the integrated measurement and control software that proves once and for all that easy doesn't have to mean simplistic.

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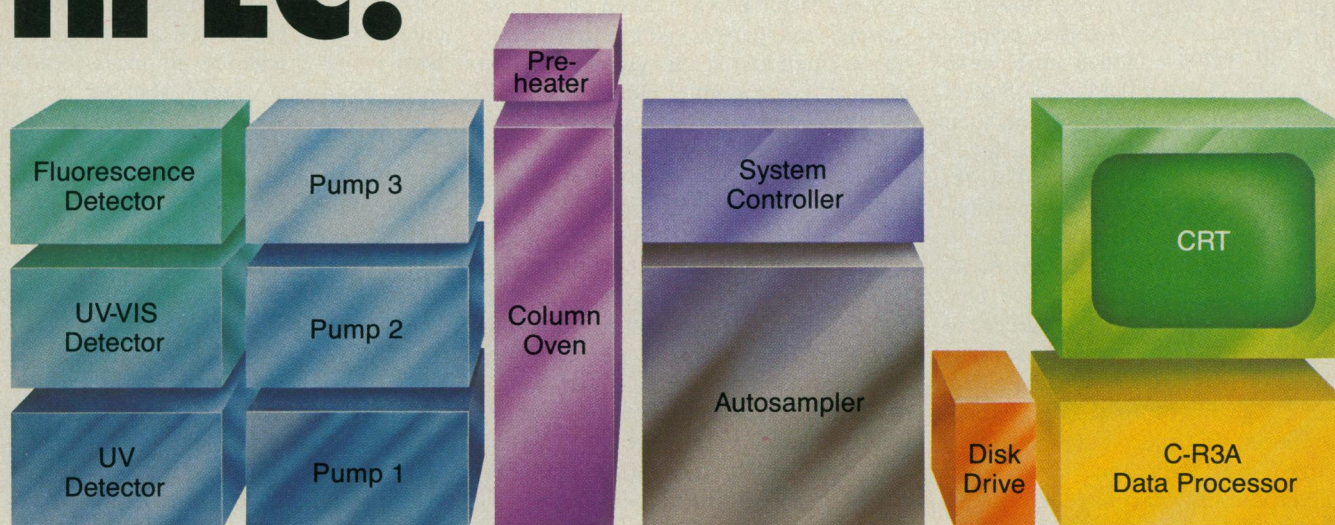


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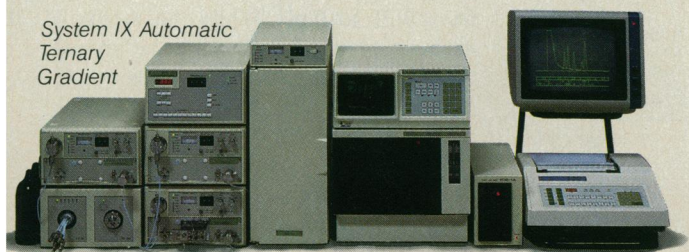
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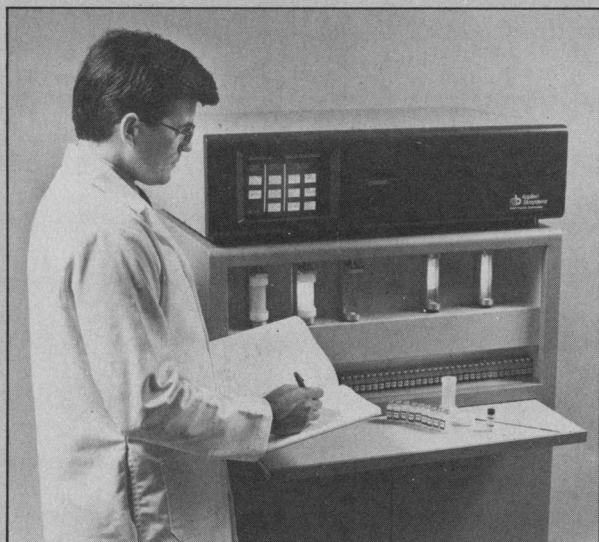
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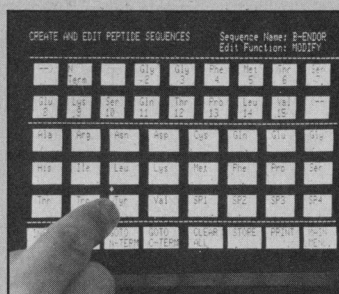
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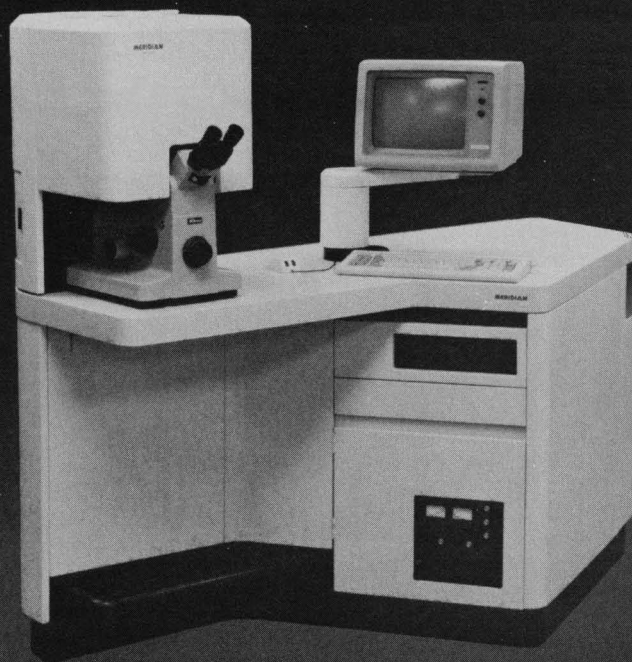
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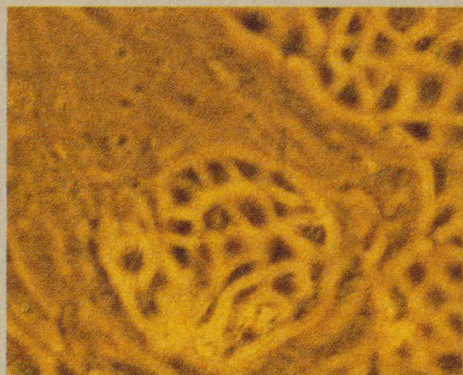




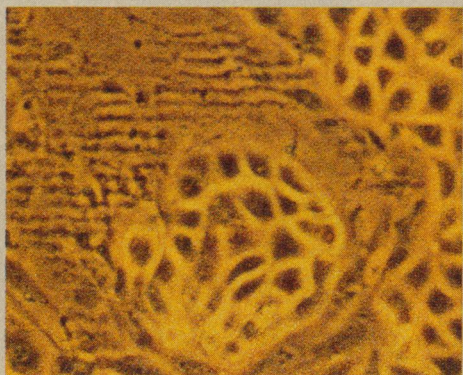
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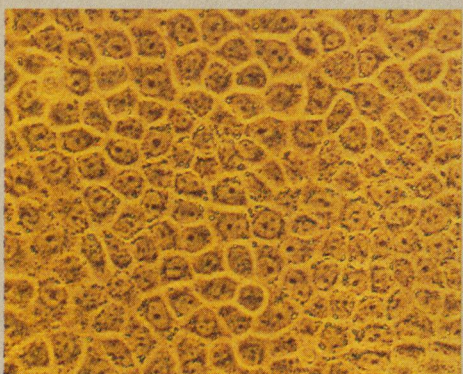
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1. Co-culture of human diploid fibroblasts and Madin Darby Canine Kidney (MDCK) cells treated with fluorescein labelled monoclonal antibodies to MDCK cells.¹

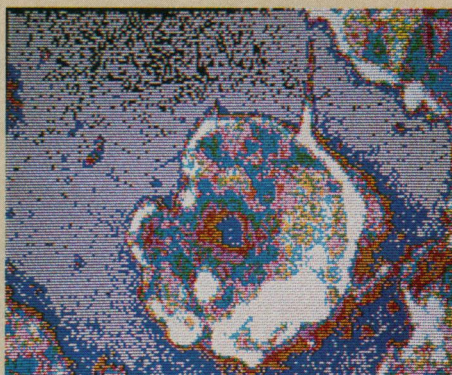


3. Same as Figure 1. Selective irradiation of non-fluorescently labelled cells with a high intensity laser beam.

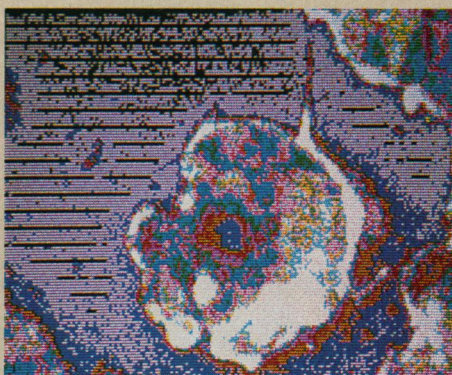


5. Growth of MDCK cells several days after exposing fibroblasts to laser irradiation.

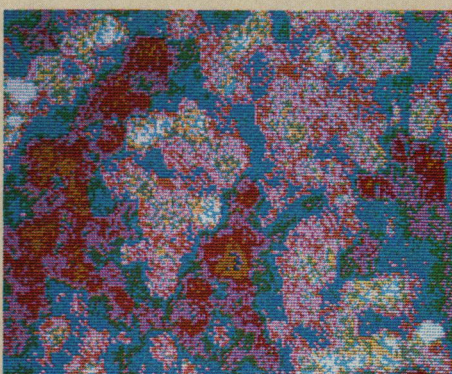
¹ Courtesy of Dr. William Smith, Michigan State University.



2. Computer-generated pseudo-color fluorescent image of labelled cells.



4. Same as Figure 2. Lines indicate the path of the laser beam, selectively leaving the MDCK cells untouched.



6. Same as Figure 5. Fluorescent image of MDCK cells after retreatment with monoclonal antibody.

Until now, existing sorting strategies have been limited to non-aggregating cells in suspension.

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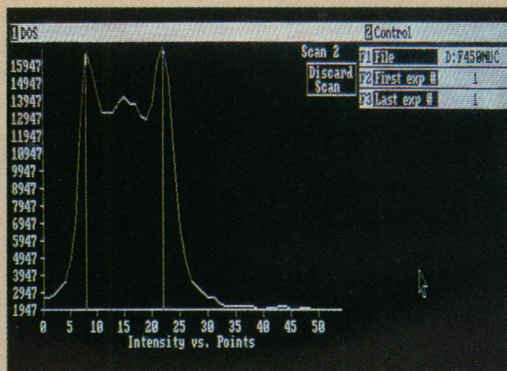
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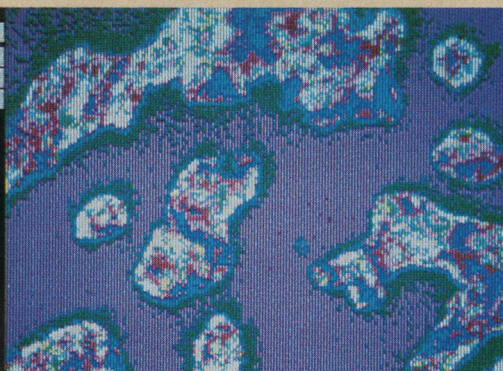
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It brings the methods of automated clonal isolation to cells growing in culture.

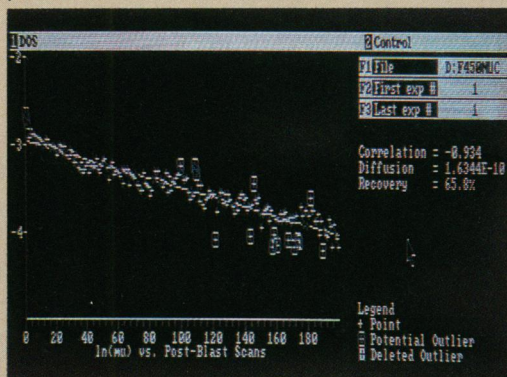
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1. FRAP analysis of isolated rat liver nucleus treated with rhodamine-labelled anti-cytochrome P-450 reductase! A fluorescence profile scan.



3. Computer-generated pseudo-color fluorescent image of Madin Darby Canine Kidney cells stained with fluorescein labelled wheat germ agglutinin.



2. Same as Figure 1. Recovery analysis plot with diffusion coefficient and per cent recovery²

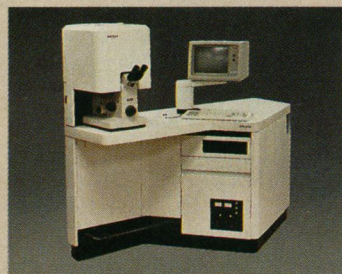


4. Laser transection of PC 12 neurites³

¹ Courtesy of Dr. Steven Aust, Michigan State University.

² Calculated by the method of Koppel *et al.* (1980), *Biophys. J.* 30, 187-192.

³ Courtesy of Dr. Steven Heidemann, Michigan State University.



The ACAS 470 Workstation.

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- cell membrane interactions
- cytoskeletal structure and organization
- intracellular transport
- nuclear structure and nucleic acid organization
- neuronal differentiation and network development
- cellular differentiation
- toxicology assays
- fluorescence redistribution after photobleaching (FRAP)
- two-dimensional fluorescence imaging
- Or perform:
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- whole tissue slice analysis
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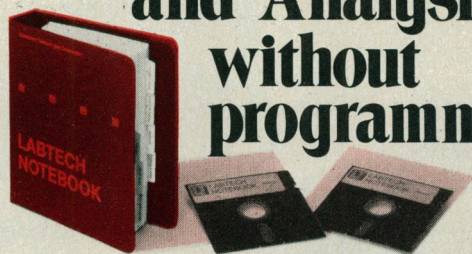
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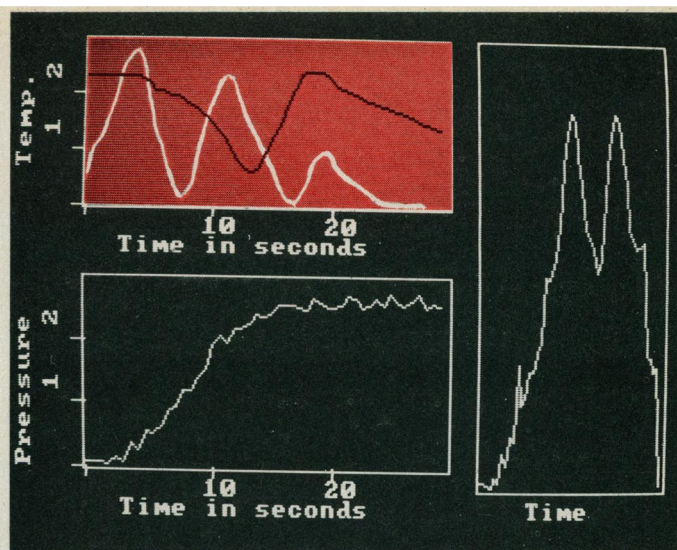
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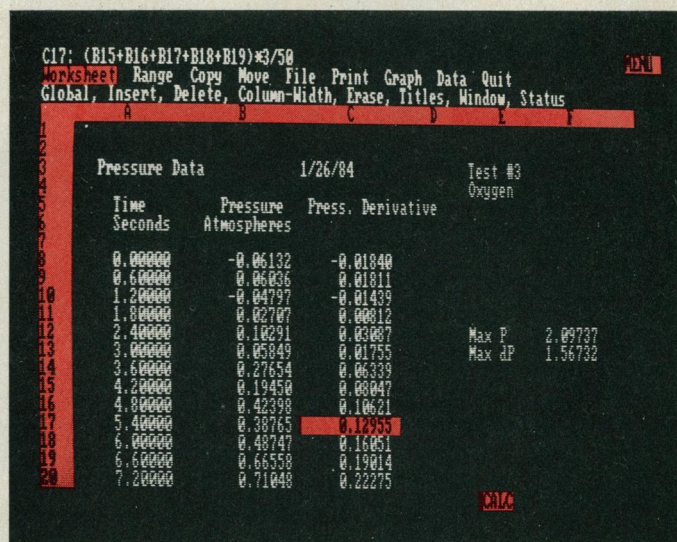


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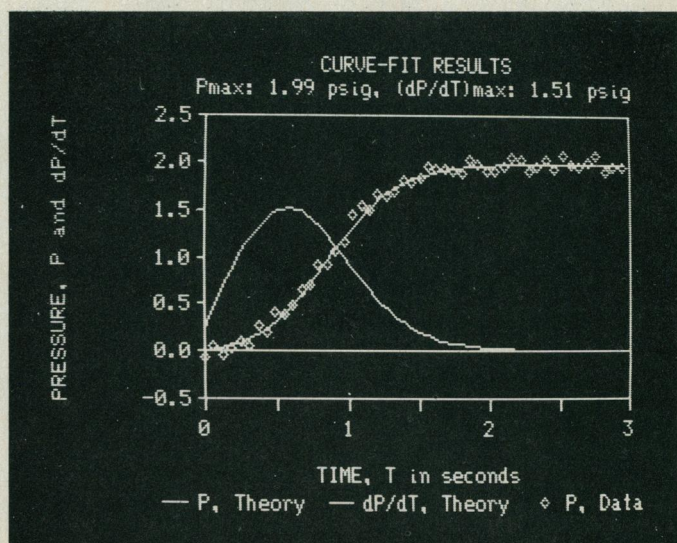
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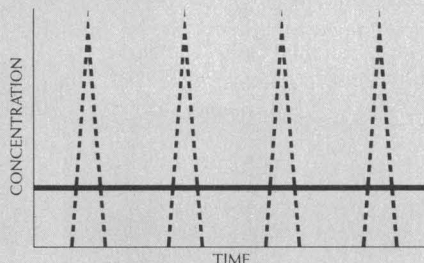


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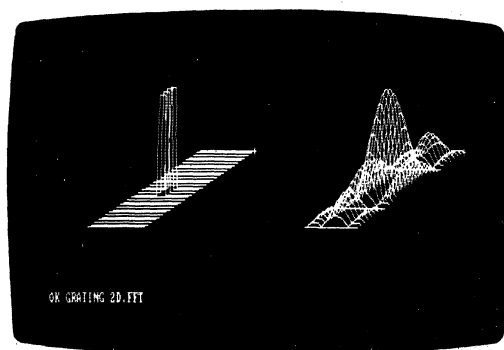
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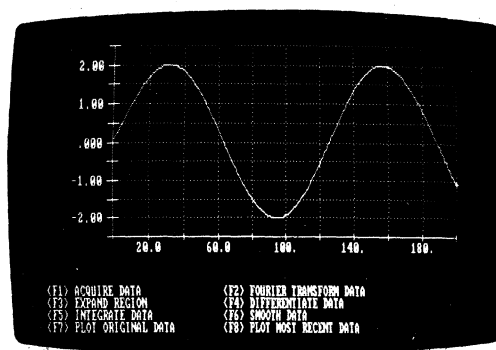
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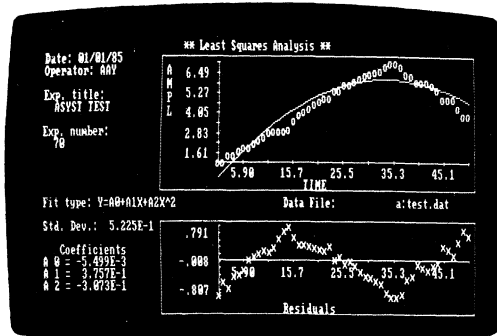
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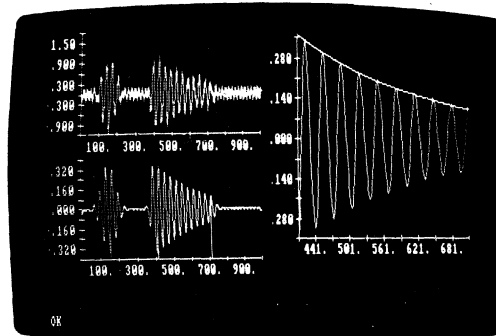
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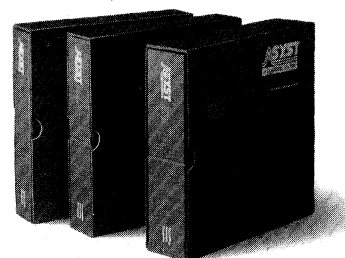
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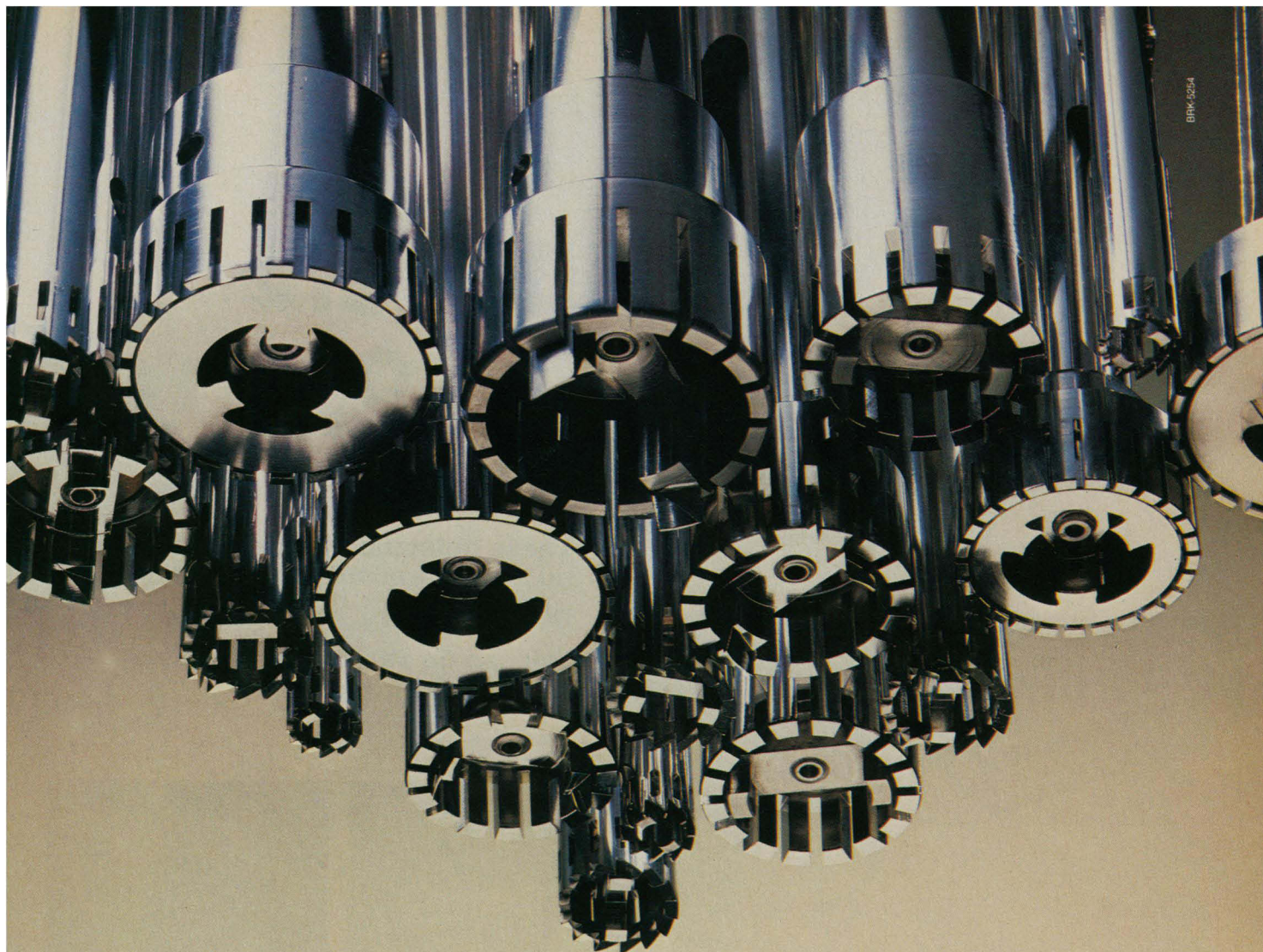
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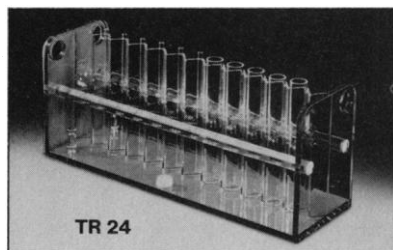
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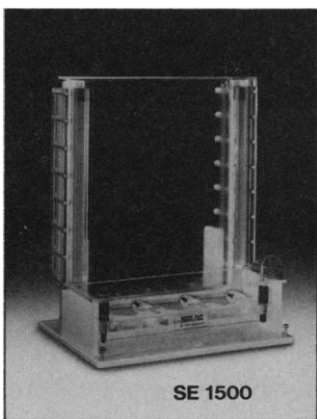
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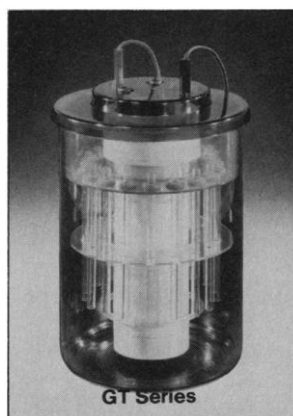
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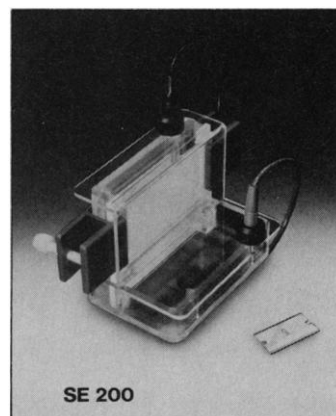
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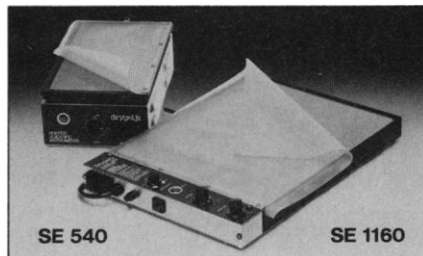
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Health, Wealth, and Unhappiness

An Administration reversal of a congressional increase in the National Institutes of Health (NIH) budget has caused great anguish among biological scientists and raises questions, not only about how much money is needed, but about the manner in which it is administered.

An objective measure of how much total funding is needed might be based on the percentage of total sales that hardfisted chemical companies spend on research. That figure is in the 4 to 6 percent range. Although the analogy is not perfect, on such a scale the NIH budget, which is approximately 1.5 percent of the total medical bill of the country, is underfunded. On a subjective basis, the arguments are even more persuasive. There are few conditions of life that the average person would prefer to good health. Those in upper-income brackets can, and do, spend almost any amount of money to be well. Happiness is not defined as "unhealthy, wealthy, and wise." For the less privileged, good health is even more vital. The salaries of professionals continue when they are ill. The wages of a carpenter do not. He depends on good health to earn his income. Recent studies have indicated that heart disease and other infirmities are more prevalent among the poor. So, in fact, curing disease would be most beneficial to those in low-income categories, even though it is advantageous to all.

On the basis of what is known, a cut in the NIH budget can hardly be justified. It is estimated that by the year 2000 Alzheimer's disease will be the single most prevalent health problem in the United States. Acquired immune deficiency syndrome (AIDS) is currently doubling in less-than-a-year intervals and spreading into the heterosexual population, a Sword of Damocles of unbelievable proportions. Each AIDS victim dies painfully and expensively; the cost of caring for those who have already contracted AIDS is estimated to be over \$400 million in hospital bills alone, to say nothing of the outpatient costs and the emotional trauma. Dramatic as this development may be, the toll of heart disease, strokes, and cancer is even higher.

Biotechnology is still in its infancy, but the "DNA Valleys" of the future may approach the size and importance of the "Silicon Valleys" of today. What is the signal to young scientists thinking about a career in biotechnology if the priorities of the government seem to fluctuate wildly? What is the message to senior investigators who have labored effectively for years if unreasonably high priority standards tell them to labor no more?

This year NIH was operating in good faith on a budget identified at 6500 grants. According to past practice, NIH had allocated one third of its funds. It was then told by the Office of Management and Budget (OMB) that (i) a major share of these funds would not be available this year and (ii) a total of only 5000 grants could be funded, a reduction from previous years. The net result is that certain investigators whose grants happen to come up in the latter part of 1985 will be caught in a competitive situation beyond the control of the individuals managing the programs.

In past crises, NIH assessed all grants in order to distribute the money more fairly, but this year OMB, in the person of the director, has micromanaged, and is telling NIH that it cannot be so flexible. This mid-course decision may be reversed, particularly if Congress has the courage of its convictions. But in the interim great damage will be done. Already investigators with long records of productivity and flattering priority scores have been told they will not be funded for the current year. Disbanding a research team and attempting to regroup it later is not the way in which science progresses. Micromanagers with microsense cause macromesses.

A happy outcome of the present turmoil would be for OMB and Congress to appoint ambassadors to meet on some neutral ground, such as Geneva, and generate a modus operandi that would allow a steady, reliable, and wise funding program. The present battle between branches of government has elements of Shakespearean comedy, but it has too many ingredients of mutually assured destruction of biomedical investigators to be viewed with amusement.—DANIEL E. KOSHLAND, JR.

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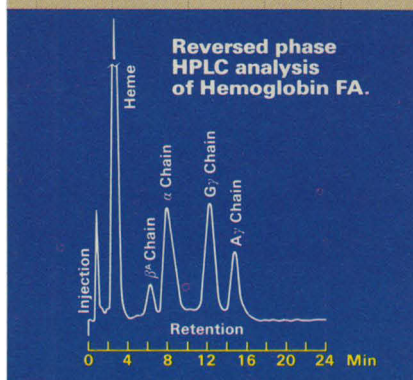
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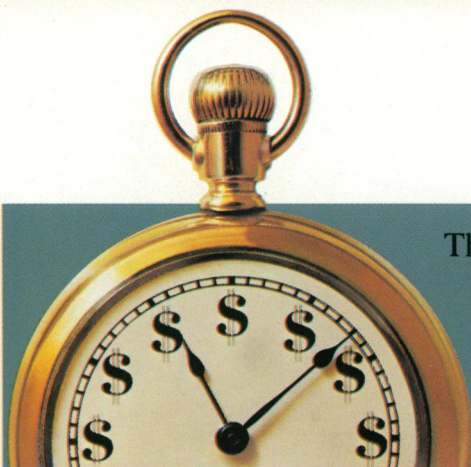
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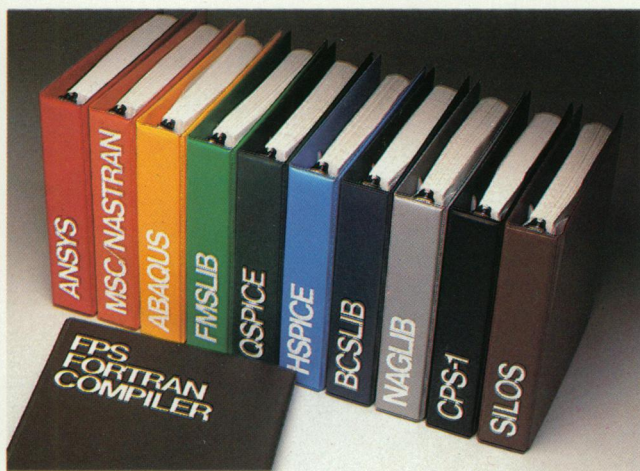
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Vector registers	4 x 2K	124 x 2K (max.)	4 x 2K
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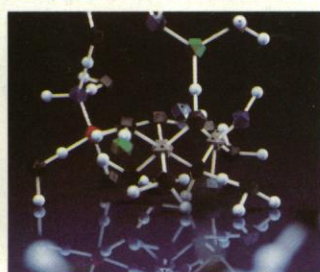
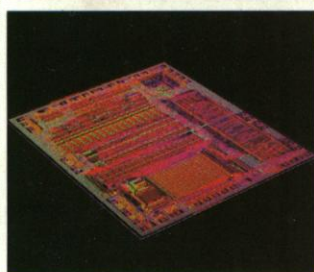
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Peak MOPS	190	1705	165
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Typical MFLOPS, LINPACK Benchmark	9.9	20.0	6.0
Whetstones (64-bit)	20,100	5800	5800
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\$K/MFLOPS (system price/peak speed)	\$16.8K	\$2.5K	\$12.3K
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Tours

General Information. Tours are limited to meeting registrants only. To order tickets, please complete the form on page 1461 and mail it to the address indicated on the form. Since Tours 7 and 11 take place partly in nonpublic areas, it is requested that all participants in these tours indicate their citizenship, in addition to name and address, in the space provided on the order form. Ticket orders received after 17 May 1985 will be held at the AAAS Ticket Desk at the Westin Bonaventure Hotel.

Handicapped persons needing advance information or assistance should so indicate on the order form, or contact Virginia Stern, AAAS Project on the Handicapped in Science, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036 (telephone: 202-467-4497). Registrants who are mobility-impaired and who have an interest in the tours which are not fully accessible should contact Virginia Stern for alternative programs.

Tour ticket prices include transportation and, where applicable, admission fees. Tickets will be mailed before the Annual Meeting; they may be refunded for full value up to 24 hours before tour departure, but no refunds will be made after that time. However, participants in Tour 8b cannot receive refunds after 25 May.

All tours depart from and return to the Westin Bonaventure Hotel at the times indicated. Comfortable walking attire is recommended.

1. J. Paul Getty Museum. Sunday, 26 May, 12 noon–5:00 p.m. (Limit: 40 persons)

The J. Paul Getty Museum, located in Malibu, is a detailed replica of a Roman seaside villa that faces a spectacular ocean view. Oil billionaire J. Paul Getty had the museum built after the plan of the Villa dei Papyri in Herculaneum, once reputedly the home of Julius Caesar's father-in-law. The original villa, buried in the eruption of Vesuvius in 79 A.D., was remodeled and reoccupied over several centuries. The design of the Getty Museum is an amalgam of plans from a 300-year period from 200 B.C. to 79 A.D. Colonnaded walkways, mosaics, frescoes, and Roman-style landscaping have been used to recreate the Mediterranean setting. The crisp and idyllic period piece is home to a collection of superb Greek and Roman antiquities on the ground floor. Small galleries face an atrium courtyard, creating viewing areas appropriately scaled for the pieces on display. Upstairs are European paintings from the Renaissance through Baroque periods and collections of French decorative art housed in period rooms.

2. Marineland. Sunday, 26 May, 12 noon–6:00 p.m. (Limit: 45 persons)

Located on the Palos Verdes Peninsula, Marineland is a combination aquarium and marine circus situated on dramatic cliffs overlooking the Pacific Ocean. The Sky Tower rises to 344 feet above sea level for a panoramic view. Inside the park are several open-air amphitheatres where sea lions, dolphins, and killer whales perform amazing stunts and charming charades in large pools. *Passages Beneath the Sea*, a series of exhibits designed by Encyclopedia Britannica, consists of 30 aquariums full of an amazing assortment of marine creatures in settings that reproduce their native habitats. The park also features walrus, large koi, and various fish in viewing tanks. The Marine Animal Care Center is a hospital behind glass, where visitors can question lab technicians about their patients via a two-way microphone. In addition, a discussion with members of the marine mammal staff has been arranged especially for AAAS participants.

3. Descanso Gardens. Monday, 27 May, 10:30 a.m.–1:00 p.m. (Limit: 45 persons)

At the 165-acre Descanso Gardens, visitors will enjoy extensive displays of roses, flowering plants, deciduous trees, and shrubs, all located in a mature California live-oak grove. The gardens are famous for their collection of camellias (100,000 plants representing 600 varieties), but these will not bloom at the time of the AAAS Annual Meeting. However, the variety of plants ensures that something is always blooming throughout the year. A serene teahouse is nestled in a Japanese-style garden that features a flowing stream forming waterfalls and pools. This visit includes a special docent-conducted tram tour of the gardens, which is not accessible to mobility-impaired registrants.

4. Griffith Observatory and Planetarium. Monday, 27 May, 6:30 p.m.–10:30 p.m. (Limit: 200 persons)

The striking green copper-domed moderne structure was designed in 1935 by John C. Austin and F. M. Ashley; the obelisk and bas-reliefs are by Archibald Garner, and the interior murals by Hugo Ballin. Displays in the Hall of Science explain astronomy and the physical sciences in participatory exhibits. The Foucault Pendulum in the center of the rotunda hypnotizes visitors with its constant gentle swing. A fascinating show in the Planetarium Theatre recreates eclipses, northern lights, and cycles of the stars through the use of a huge Zeiss projector.



The J. Paul Getty Museum

Arrangements have been made for a special tour of the Observatory including the Foucault pendulum, the Tesla coil, and a special presentation on California's role in astronomy from the American Indians to the Space Age. There will also be an opportunity to look through one of California's largest public telescopes (not accessible to registrants in wheelchairs).

5. Lawry's California Center. Tuesday, 28 May, 9:30 a.m.–1:00 p.m. (Limit: 40 persons)

Lawry's California Center is the corporate headquarters and the western manufacturing facility of Lawry's Foods, Inc. This specially arranged behind-the-scenes tour will show how the company's more than 110 products are made. Your visit will take you to the test kitchens, production facilities, and laboratories. (Please note that this part of the tour involves two flights of stairs and is not accessible to mobility-impaired registrants.) The manufacturing facility is surrounded by one of Los Angeles' most beautiful gardens where, as an optional lunch, you may want to sample the Mexican-style dishes or barbecued meat specialties featured in the outdoor dining areas. There is also a gift shop and a gourmet shop.

6. NBC Television Studios. Tuesday, 28 May, 12 noon–3:00 p.m. (Limit: 40 persons)

Famous as the home of the "Tonight Show," the NBC Television Studios are the largest color facilities in the United States. A special tour has been arranged for AAAS participants which will allow a behind-the-scenes look at how television shows are produced and transmitted to NBC affiliates throughout the country. Following the tour, the Commis-

sary will be open for an optional late lunch or snack, or a little "celebrity gazing."

7. Jet Propulsion Laboratory. Wednesday, 29 May, 9:00 a.m.–12 noon (Limit: 75 persons)

The Jet Propulsion Laboratory (JPL) is affiliated with the California Institute of Technology, although it is not an educational facility. The American Space Age began 31 January 1958, with the launch of JPL's Explorer I, the first U.S. satellite and the discoverer of the Van Allen radiation belts that surround the earth. This visit will cover JPL's activities from the early days to the present, including a general overview of the Laboratory's planetary and earth science activities, as well as a tour of the Space Flight Operations Facility and the Spacecraft Assembly Facility in which the Galileo spacecraft is currently undergoing tests. This tour is not accessible to mobility-impaired registrants.

8. Mini Walking Tour of Downtown Los Angeles: a. Tour only; b. Tour and Lunch. Wednesday, 29 May, 12 noon–2:00 p.m. (Limit: 50 persons)

A guided walking tour of historic architecture in downtown Los Angeles takes you to the great buildings around Pershing Square, including the Biltmore Hotel and the Bradbury Building. Discover the stately and elegant architecture of the former "Wall Street of the West" and see the sumptuous movie palaces in Broadway's Historic Theater District. Participants in the second part of this tour will have lunch in the Boardroom Restaurant located in the historic Design Center of Los Angeles. Since the restaurant requires final reservations 3 days in advance, no refunds can be made after 25 May.

9. California State Museum of Science and Industry. Thursday, 30 May, 10:00 a.m.–1:00 p.m. (Limit: 90 persons)

The California State Museum of Science and Industry has undergone a magnificent renaissance and today stands as one of the premiere museums in the country. During the past three years of planning and rebuilding, the museum has grown threefold. The new Aerospace Museum tells the story of flight and space and beyond, with fascinating displays. In the IMAX theatre, "passengers" will enjoy a thrilling trip above the United States via the most modern film and sound technology. Our special docent tour will also include the Hall of Health, the Science Wing, and the Afro-American Museum.

10. Huntington Library, Art Galleries, and Botanical Gardens. Thursday, 30 May, 1:00–4:30 p.m. (Limit: 90 persons)

Located in San Marino, the 207-acre estate and former home of Henry E. Huntington (1850–1927)—a pioneer railroad tycoon and philanthropist—is now one of the greatest attractions in Southern California. The Huntington residence houses the art gallery with a collection that emphasizes English and French painting of the 18th century. Among the famous works displayed are Gainsborough's *Blue Boy*, Lawrence's *Pinkie*, Reynolds' *Sarah Siddons as the Tragic Muse*, and Romney's *Lady Hamilton*. The gallery also exhibits an

impressive collection of English and French porcelains, tapestries, graphics, drawings, and furniture. The Library houses extensive holdings of English and American first editions, manuscripts, maps, letters, and incunabula such as a Gutenberg Bible, a first folio of Shakespeare plays, and Benjamin Franklin's autobiography in manuscript. The gardens, begun in 1904, were designed and developed by William Hertreich. They contain, among others, a Shakespearean garden of plants mentioned by the Bard, a Japanese garden with specimens of bonsai, and a 12-acre desert garden with a large and unique variety of cacti and succulents. Our group will be greeted by Robert Middlekauf, Director of the Huntington.

11. Rockwell International Space Transportation Systems. Friday, 31 May, 1:00–4:00 p.m. (Limit: 90 persons)

This visit to the Rockwell International Space Transportation Systems Division in Downey will include a tour of full-size mock-ups of a Space Shuttle Orbiter and a Space Station habitable module. A briefing will be conducted on the accomplishments, benefits, and future applications of the Space Shuttle. Special audiovisual shows will also be presented. The Orbiter mock-up is not accessible to mobility-impaired participants. Otherwise, the tour is accessible.

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2.	Marineland (26 May)	17.50	_____	8.	Walking Tour (29 May):		
3.	Descanso Gardens (27 May)	10.00	_____	a.	Tour only	3.00	_____
4.	Griffith Observatory and Planetarium (27 May)	10.00	_____	b.	Tour and lunch	13.00	_____
5.	Lawry's California Center (28 May)	7.00	_____	9.	California State Museum of Science and Industry (30 May)	5.50	_____
6.	NBC TV Studios (28 May)	7.00	_____	10.	Huntington Library, Galleries, and Gardens (30 May)	7.00	_____
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