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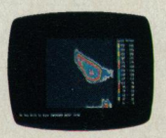

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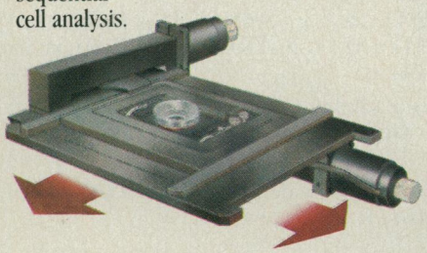

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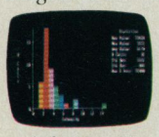
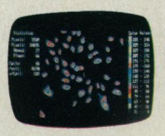


Perform quantitative fluorescence analysis on large numbers of cells



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SCIENCE

ISSN 0036-8075
16 MAY 1986
VOLUME 232
NUMBER 4752

■ **SCIENCE is published weekly on Friday, except the last week in December, and with a plus issue in May 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 $24, 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. **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.

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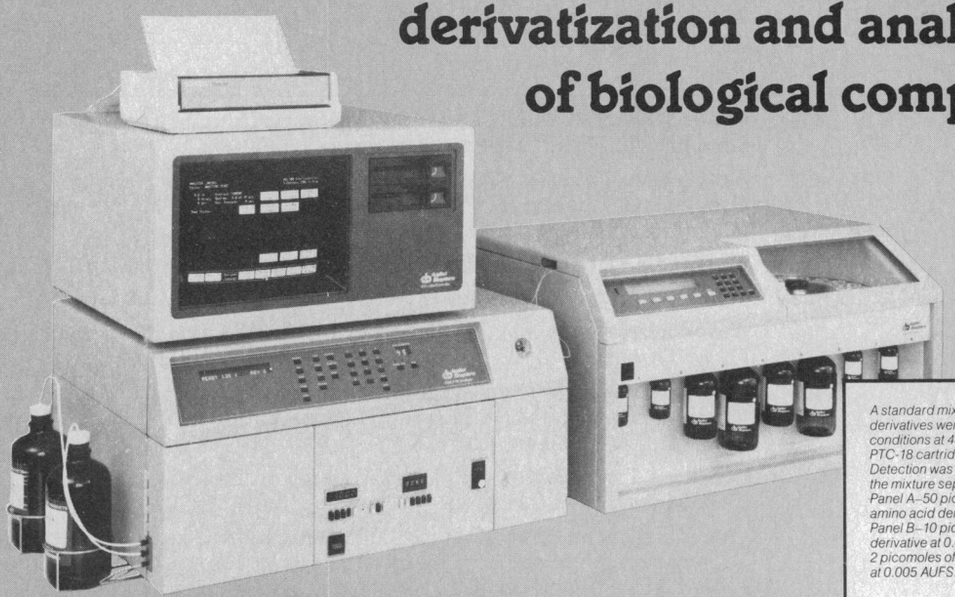
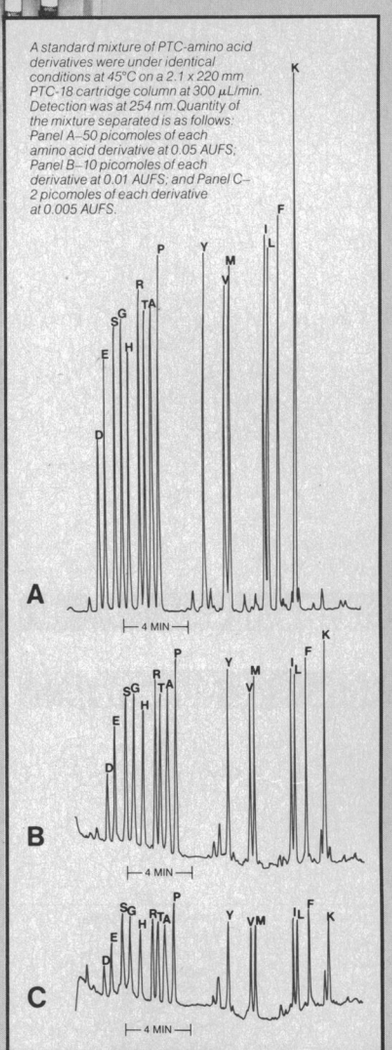
COVER Particle Beam Fusion Accelerator II (PBFA II) at Sandia National Laboratories was activated for the first time on 11 December 1985; it will be used to study inertial confinement fusion with light ion beams. The intense discharges on the surface were formed by the stray electromagnetic energy emanating from the 100-trillion-watt accelerator. See page 831. [Courtesy of Sandia National Laboratories, Albuquerque, NM 87185]

BIOSYSTEMS UPDATE

A new, multi-method system for the derivatization and analysis of biological compounds





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Natural processes neutralize acid lakes

REGENERATION of alkalinity in a lake can occur through natural biological and geochemical processes that remove anions and add cations and thus neutralize the lake's acidity (page 844). Three years of alkalinity measurements in the waters of a Canadian lake, the streams feeding it and flowing from it, and local precipitation show that alkalinity is generated directly in the lake itself. The biological processes contribute more than do the geochemical processes to the neutralization of the waters. After experimental acidification of a second lake by addition of sulfuric acid, sulfate removal was enhanced as was calcium exchange, and the manganese flux from sediments to water increased as the waters returned toward alkalinity. Schindler *et al.* predict that once acid rain from human-generated activities is reduced, alkalinity should be restored to lakes as a result of naturally occurring processes.

Fossil flora

FLOWERING plants increased in diversity, abundance, and complexity during the middle part of the Cretaceous Period, developing many of the features that are found in their descendants today (page 852). Crane *et al.*, excavating in the Patapsco Formation of Maryland, collected angiosperm fruit, seed, pollen, and other reproductive and floral specimens that predate by 6 million years the earliest angiosperm flowers and associated pollen reported previously. The 100-million-year-old specimens, found among wood fragments, cones, seeds, and shoots of conifers, were recovered from fossil-rich sediments by sieving. A direct genetic relation of the Cretaceous angiosperms with contemporary flowering plants in the sycamore family (Platanaceae) was established with scanning electron micrographs of the well-preserved specimens. Though modern Platanaceae are wind pollinated, the Early Cretaceous flowers appear to have been insect pollinated, as judged by pollen-grain sizes, pollen distribution on flowers, and the arrangement of floral parts.

Butterfly memory bank: short and sweet

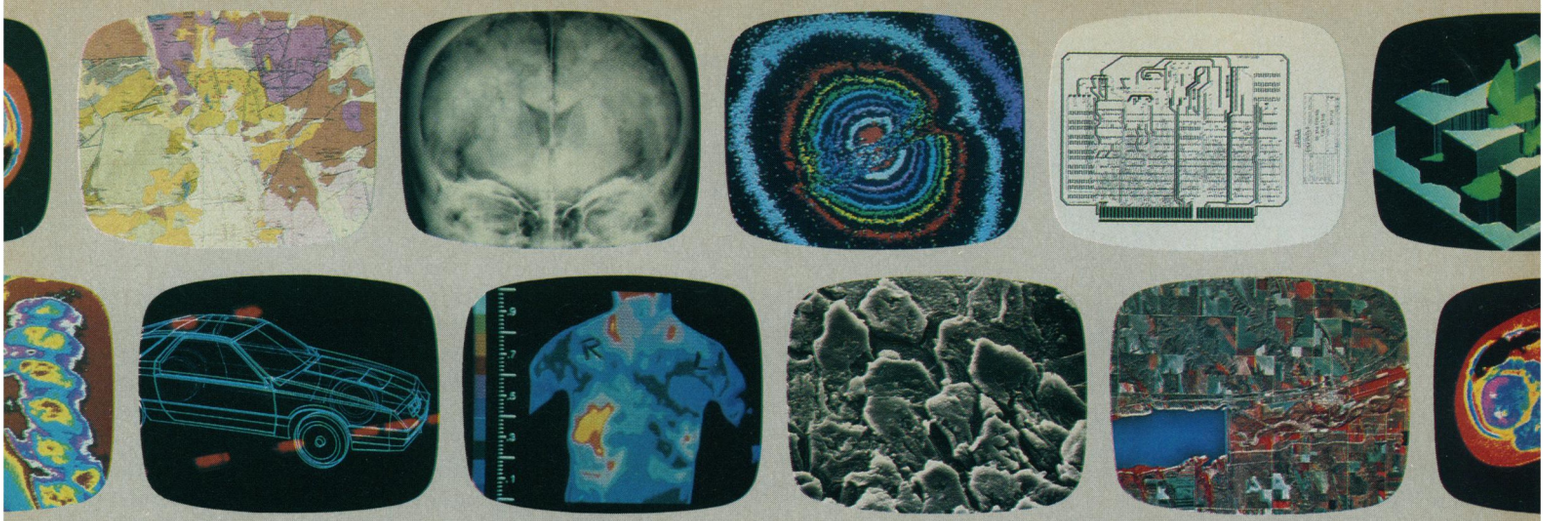
DARWIN suspected that there was a reason why insects repeatedly drank nectar from flowers of only one species, and he was right; valuable time and energy are lost by any butterfly that learns how to extract nectar from more than one kind of flower (page 863). Cabbage butterflies were caged with two types of flowers. Each butterfly showed a preference on the first feeding, and most continued to choose their first-choice flower in subsequent trials. Butterflies could learn how to drink from a new flower, with the "discovery time" from landing to finding nectar decreasing for most on successive attempts; only a few gave up trying to "learn" the new plant after a number of unsuccessful trials. Lewis found that memory for nectar-gathering on the first-choice flower faded when a second flower was learned, and the technique for collecting nectar from the first flower then had to be relearned. Inconstancy thus taxes the memory; it costs the butterfly time and energy (more than half of the adult butterfly's energy comes from nectar) and may increase the risk of predation as the butterfly lingers to learn each new floral species. That the butterfly drinks nectar of a single species also benefits the plant, ensuring cross-fertilization within this species.

Bacteria are sinks, not links

WHAT role do bacteria play in planktonic food webs of coastal waters (page 865)? One possibility is that they are a source of food for larger organisms, a "microbial loop" that incorporates dissolved organic material and returns energy to the web. Another possibility is that they regenerate inorganic material for the web through their metabolic activities. Ducklow *et al.* traced the uptake of radioactive carbon in glucose through a community of bacteria, protozoa, diatoms, copepods, and gelatinous zooplankton—a typical Scottish sea-loch community in middle to late spring—in a water column enclosed in a polyethylene cylinder. Within the first 4 to 6 hours of the experiment, over 90% of the glucose was removed from solution, presumably by bacteria. In the next 55 days, the radioactive carbon was redistributed. Less than 5% moved up the food web into larger organisms. Most was taken up by bacteria and then passed directly to carbon dioxide or to dissolved organic carbon. At least for carbon, the bacteria were important as nutrient regenerators. Such regeneration is probably crucial for perpetuation of marine plankton webs, in some of which bacteria can account for up to 20% of the carbon biomass.

Probe for hepatitis agent

A sensitive probe is now available for detecting the delta agent, a virus that can cause hepatitis in the serum of infected individuals (page 873). The delta agent has been elusive; it is a defective virus that replicates, is expressed, and causes serious liver disease only in people who are infected with the hepatitis B virus. Denniston *et al.* prepared a DNA strand that is complementary to a portion of the genetic material (RNA) of the delta virus. The sequence of the DNA strand was determined, and the amino acid sequence of the protein for which it codes was deduced. The complementary DNA hybridized only to RNA from the delta agent: in normal serum, no reaction was measured; reactions were detected in serum from patients with hepatitis B virus infections. In the past, diagnosis of delta virus infection has required a liver biopsy for detection of hepatitis antigen in tissue. The new procedure is a noninvasive one in which RNA is detected in serum of patients having either chronic or acute delta infections.



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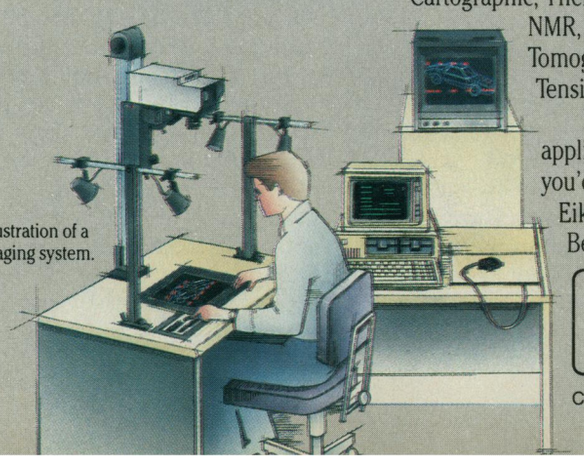

Illustration of a typical imaging system.

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The Winds of Change

Truth, like radioactivity, is difficult to contain. It tends to drift out of control. Small amounts are easily detectable and usually serve as tracers to larger and more significant revelations. The Soviet Union is learning this, and it will be interesting to see whether the fallout from their policy of secrecy is even more significant than the decaying fission products that illustrate it.

Reporters and government officials in foreign countries are carrying out a type of forensic medicine, trying to diagnose the events that have occurred in Chernobyl. In the face of the conventional secrecy of the Soviet Union, distant measurements of radioactivity and the expertise of scientists are being used to reconstruct what probably occurred. Perhaps of even more importance than the accident itself will be the illumination of the procedures of decision-making in the Soviet Union. One has to wonder whether someone in the lower echelons of the decision-making apparatus urged, "This is an accident that cannot be concealed. We should not follow our convention of secrecy but should announce it immediately." If anyone said this, he or she was clearly overruled.

The tendency to suppress or to conceal bad news is endemic in every government, in every civilization: history tells us what happened to messengers who brought bad news. The United States, when in the grip of McCarthyism fired the China hands who told unpleasant truths. Democracies have an enormous antidote to any desire to conceal truth: a free press. Dictatorships can suppress news in some cases, but nuclear disasters are different. Once sizable amounts of radiation have escaped local containment, any competent scientist could explain that it will be measured abroad. A combination of curiosity and anxiety will maintain the pressure to learn what actually happened at Chernobyl. From a scientist's point of view, this curiosity is well justified and is not merely a desire for gossip.

The nuclear power industry is here to stay despite its difficulties. Its future depends on incremental increases in safety, much like the airline industry which has progressed by careful study of each accident. Hard data—what set off the fire, exposure of individuals, retention of radioactivity in the soil, for example—are invaluable if analyzed objectively and scientifically. The privilege of operating a nuclear reactor should imply the responsibility to warn others of potential hazards and to provide information for a global improvement in safety.

The initial Soviet secrecy and delay in announcing the accident were bad mistakes. Continuation will further erode Soviet credibility. Gorbachev now has a chance to look inside his bureaucracy. Did anyone predict the course of events? If so, should not they be strengthened as future advisers? If no one spoke up, was it due to incompetence or fear of a policy rigidity? Whatever the cause, changes are clearly needed.

Just before the Soviet's guarded announcement of the catastrophe, there was a meeting at the National Academy of Sciences on command and control decisions during a nuclear crisis. Discussed were the awesome decisions that must be made should a nuclear confrontation between superpowers arise. Facts about troop movements, submarine deployments, and other defense strategies are only one aspect of crisis management; the decision-making apparatus and its ability to encourage and evaluate wildly different hypotheses are equally important. The accident at Chernobyl and its handling by the Soviet government is obviously going to effect our perception of its handling of even more important crises among the superpowers. The tendency of crisis managers to escalate military options on a preprogrammed scenario increases if they believe that the other side cannot adapt to new information. A system that has flexibility is needed for far more than determining electric power needs or public relations.

If there is any silver lining to this episode, it may be the message that those who tell painful truths in private are more helpful than those who accede to the party line. When facts travel on the wind, they should trigger information that travels even faster.

—DANIEL E. KOSHLAND, JR.

tion, fluoridation of water supplies as an effective method for reducing the incidence of dental caries. Support of these highly successful programs was based on evidence from critical evaluation of conjectures—hypotheses—about solutions for the problems and the results of rigorous experimentation directed toward disproving the various existing hypotheses. This is how scientific knowledge is established.

Nutrition scientists have supported recommendations for healthful diets for over 60 years. They have supported strongly recommendations for inclusion of vegetables, particularly those rich in vitamins A and C, and a moderate amount of fiber in diets (*1*); they have not recommended either low- or high-fat diets, but have recognized that appropriate recommendations for fat intake depend on many factors; they have emphasized control of caloric intake and weight control (*2*). They have not, however, promised, by implication or innuendo, that consuming a healthful diet will reduce the incidence of chronic and degenerative diseases, because that hypothesis has failed to withstand critical evaluation.

When close to 80 percent of infants born live to age 65 and beyond, when the life expectancy of male infants is 72 years and that of females is 78 years—even for those who die of coronary heart disease (*3*), and when those who reach 65 have a life expectancy of 15 years, the evidence has to be very good indeed to support a prediction with any degree of certainty that eating more vegetables and fiber and less fat will reduce the incidence of early deaths from diseases associated with aging.

It is not surprising that nutrition scientists are skeptical about claims for disease prevention through diet modification.

ALFRED E. HARPER
Departments of Nutritional Sciences and Biochemistry, University of Wisconsin, Madison, WI 53706

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2. Food and Nutrition Board, *Toward Healthful Diets* (National Academy of Sciences, Washington, DC, 1980).
3. C. H. Slater *et al.*, *Am. J. Clin. Nutr.* **42**, 329 (1985).

Hic, Haec, Hoc . . .

"*De gustibus non est disputandem*"? Quousque tandem, Catilina, must we endure such headlines? That Mark R. Braford, Jr. (Reports, 25 Apr., p. 489), and perhaps the editors of *Science* as well, could do with a few Latin lessons, *non est disputandum*. Although it has now been more than 65 years since I studied Cicero and Horace, I offer my (free) services as Latin Headline Editor.

HANS WEIL-MALHERBE
6213 East Holbert Road, Bethesda, MD 20817

Erratum: In the article "Solving knotty problems in math and biology" by Gina Kolata (Research News, 28 Mar., p. 1506), the affiliation of Morwen Thistlethwaite, mentioned in the legend of the second figure on page 1507, should have been Polytechnic of the South Bank in London.

Erratum: The title of the report by Mark R. Braford, Jr., in the issue of 25 April (p. 489) should have been, "*De Gustibus Non Est Disputandum*: A Spiral Center for Taste in the Brain of the Teleost Fish, *Heterotis niloticus*."

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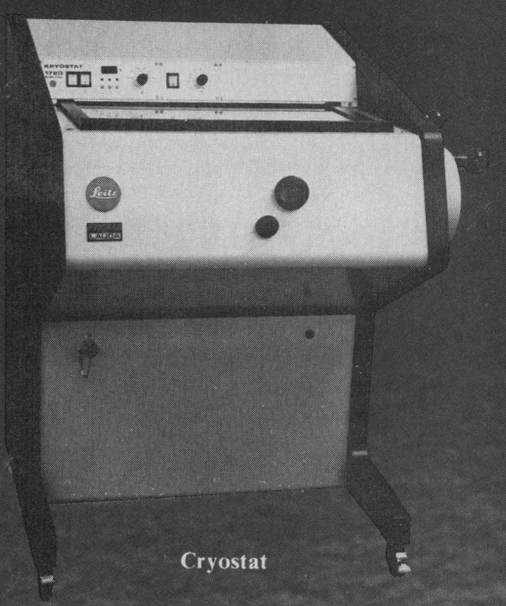

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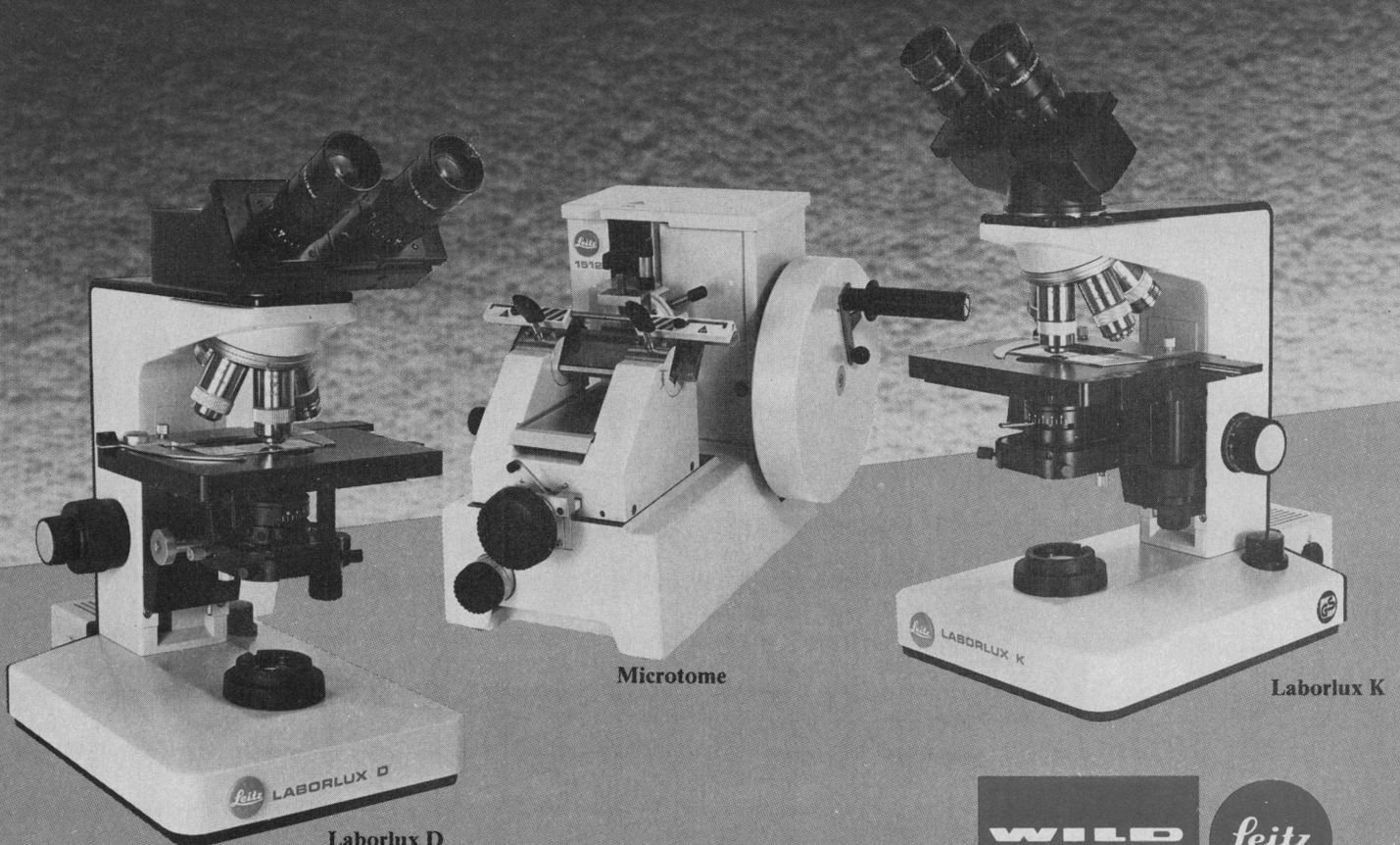

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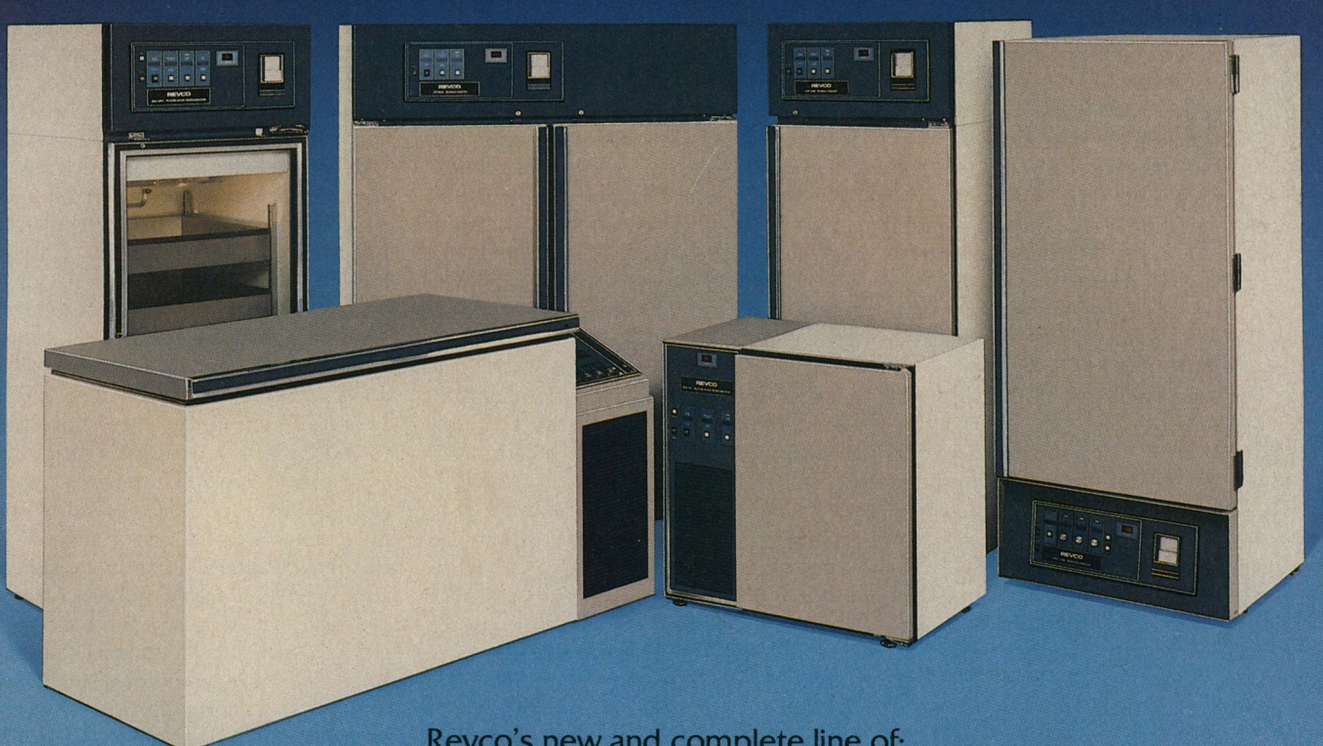

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TENTATIVE PROGRAM

SUNDAY EVENING, AUGUST 10

KEYNOTE ADDRESS: MECHANISMS OF CELL PROLIFERATION

Speaker: *Renato Baserga*

MONDAY, AUGUST 11

TUMOR NECROSIS FACTOR AND OTHER CYTOTOXIC MEDIATORS

Chairman: *P. Henkart*
Comparison of TNF and Lymphotoxin: *B.B. Aggarwal*
Cachetin: *B. Beutler*
Interplay of TNS, IL 1, and Interferons in Monocytes Cytotoxicity: *Lois B. Epstein, M.D.*
Soluble Factors in Cell-Mediated Cytotoxicity: *P. Henkart*
Regulation of Hematopoietic Cells by Cytotoxins: *G. Trinchieri*

INTERFERONS AS REGULATORY AGENTS

Chairman: *M. Revel*
Regulation of Interferon Gene Expression: *John D. Stobo, M.D., John Hopkins University*
Beta$_2$ Interferon: *M. Revel*
Growth Factors as Interferon Inducers: *J. Vilcek*
Interferon Receptors: *S. Pestka*
Regulations of Oncogenes Expression by Interferons: *R.M. Friedman*

TUESDAY, AUGUST 12

INTERLEUKIN 2 AND OTHER GROWTH FACTORS

Chairman: *T.A. Waldmann*
The Nature of IL 2 Receptor: *T.A. Waldmann*
IL 2 Ligand-Receptor Interactions: *K.A. Smith*
Intracellular Transduction Pathways in IL 2 Stimulation: *S. Cohen*
Protein Kinase C in IL 2 Action: *W.L. Farrar*
B Cell Growth Factor: *A.L. Maizel*

INTERLEUKIN 1, COLONY STIMULATING FACTORS

Chairman: *C.A. Dinarello*
Structural Studies of IL 1: *C.A. Dinarello*
The Role of IL 1 in the Central Nervous System: *L.B. Lachman*
IL 1 and Rheumatoid Arthritis: *E. Amento*
Biologic Effects of Colony Stimulating Factors: *M. Moore*

WEDNESDAY MORNING, AUGUST 13

POTENTIAL CLINICAL APPLICATIONS

Chairman: *C.F. Nathan*
LAK and IL 2 in Cancer Therapy: *M.T. Lotze*
Adoptive Transfer of Interferon-Activated Macrophages: *H.C. Stevenson*
Interferon in Malaria: *Victor Nussenzweig, M.D.,*
Inhibition of Intracellular Micro-organism by Cytokines: *Christine W. Czarniecki*
Gamma Interferon in Leprosy and AIDS: *C.F. Nathan*

CONCLUDING REMARKS: *S. Cohen, J. Vilcek*

REGISTRATION FORM

$350 – Pre-Registration Fee (Received by July 1, 1986)
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