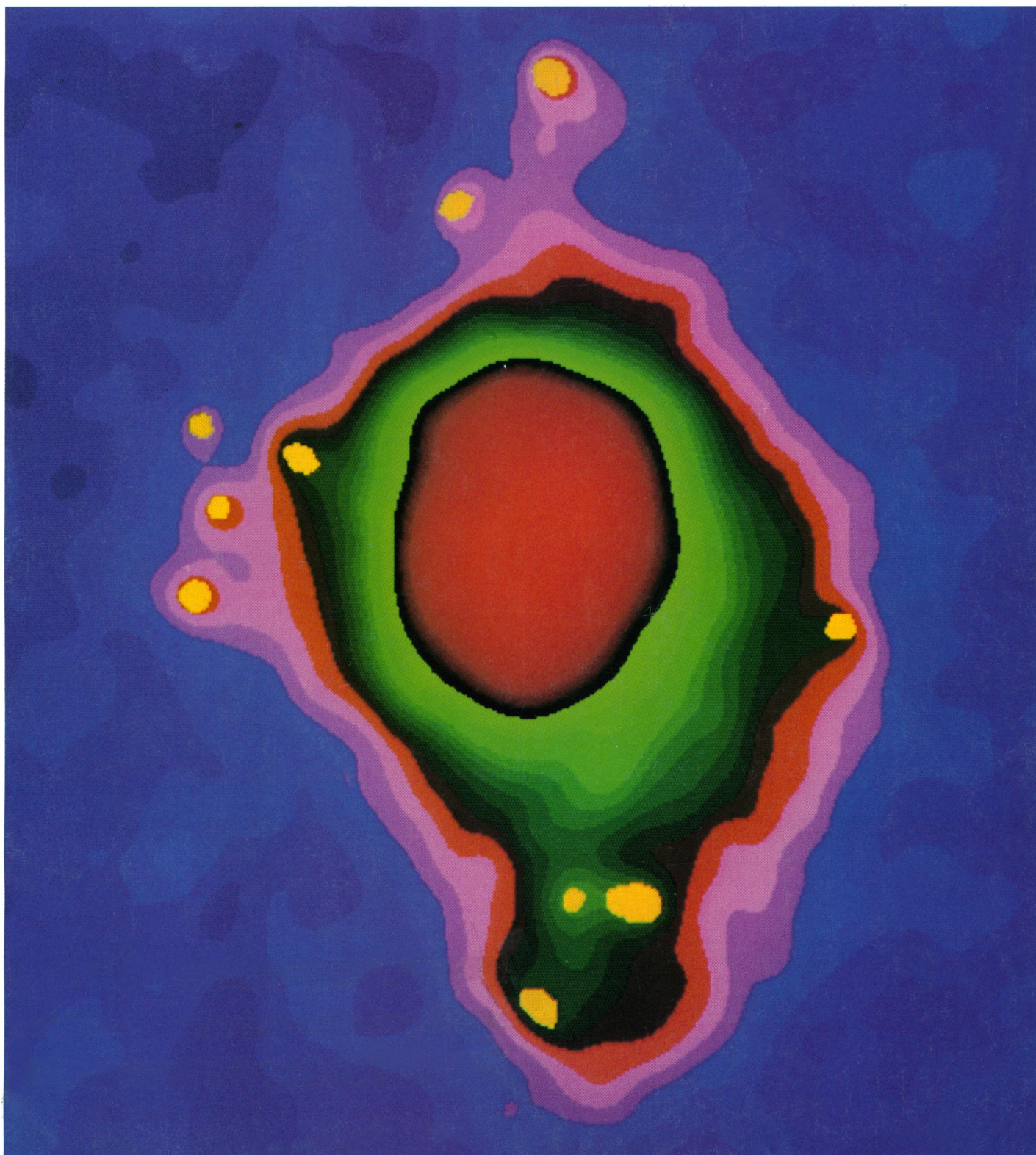


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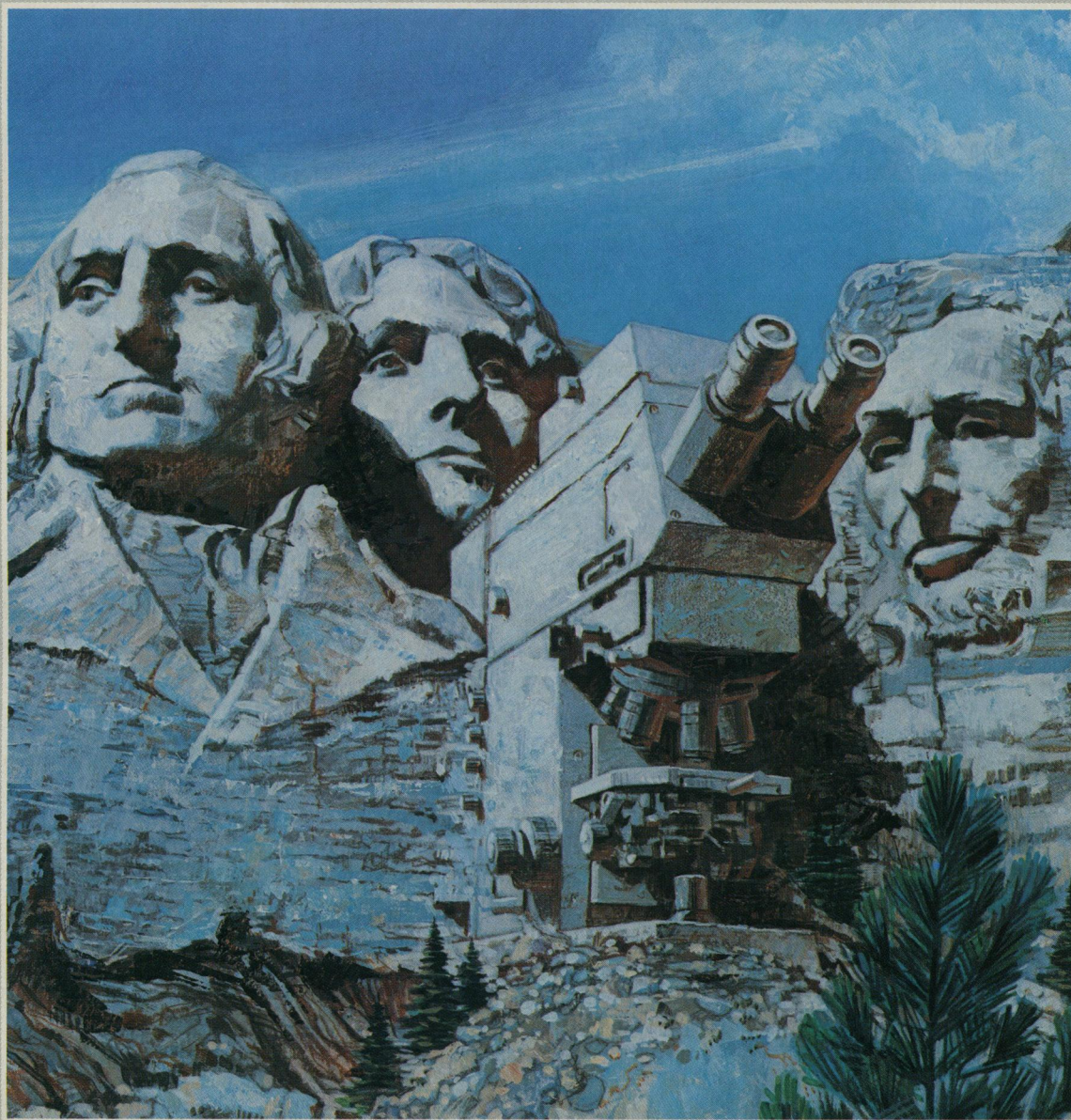
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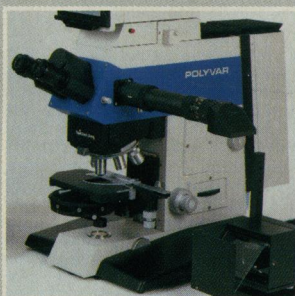
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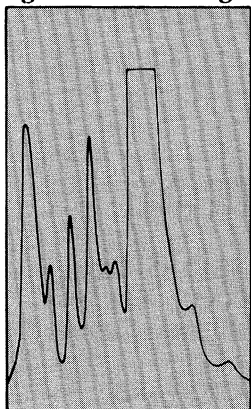
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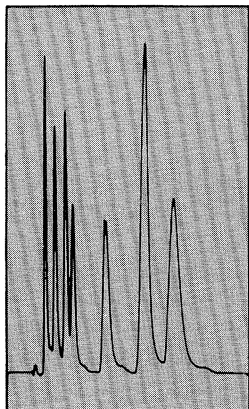
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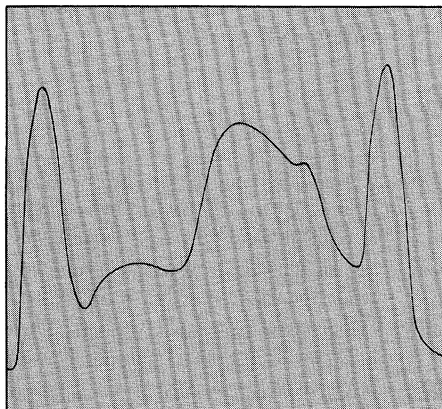
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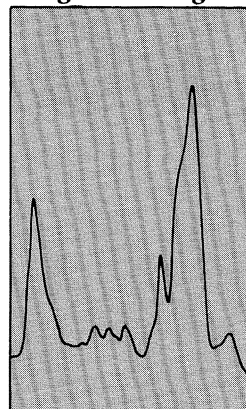
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This Week in SCIENCE

Marginal ice zone

FRAM Strait, between Greenland and Spitzbergen, is the main conduit for ice flowing out of the Arctic Basin and for the exchange of water between the Arctic and Atlantic oceans (pages 427 to 439). Scientists from France, Norway, the United States, Germany, and England have collaborated in studies of Fram Strait's marginal ice zone (MIZ) where water and ice meet. A picture of the MIZ—its morphology, the position of the ice edge, the age of the ice, the dynamic features of the region—is developing from data obtained with aircraft and satellite imaging techniques, sensing devices tethered to drifting ice or towed by ships, and ice coring experiments. The East Greenland Polar Front, the boundary between inflowing warm saline-rich water and outflowing cooler Arctic water, is a source region for eddies and meanders. Bottom topography can also generate and later control local and large-scale circulation patterns. Eddies play an important part in the transfer of heat, salt, mass, biological materials, and chemical constituents between water and ice and, along with other processes, affect the rate at which ice melts. The MIZ studies attest to the complexity of interactions among atmosphere, ocean, and ice.

Role of α subunit of G proteins

THE protein G_k , when activated by the muscarinic acetylcholine receptor, causes potassium channels to open in heart cell membranes (page 442). At the time of activation, the three-subunit (α , β , γ) protein dissociates to two complexes, an α complex and a $\beta\gamma$ complex. Codina *et al.* purified and separated the two complexes from human red blood cells and from bovine brain cells. Only the α -containing complexes induced the opening of potassium channels in heart cell membranes: the potency of purified α complexes was equal to that of the original G_k preparation, and similarities

in current amplitudes and length of time that channels remained open suggested that the α complex and G_k opened the same channels. The $\beta\gamma$ complex did not open channels. G_k is thus like G_s (a G protein involved in such processes as smelling) and transducin (a protein involved in seeing) in using its α complex for carrying out effector functions; other G proteins form α and $\beta\gamma$ complexes upon activation and may also rely on α for specificity in interacting with channels or enzymes to transduce signals in diverse cell types.

Genetic damage in atom bomb survivors

SURVIVORS of the atom bomb that was dropped on Hiroshima have a specific alteration in gene expression that reflects the dose of radiation they received (page 445). Glycophorin A (GPA) is found on the surface of red blood cells; mutations to GPA genes cause cells that should be heterozygous (having two kinds of GPA molecules) to instead be hemizygous (expressing only one kind of GPA). Langlois *et al.* used monoclonal antibodies to determine whether blood cells of survivors—those whose radiation exposures ranged from about 0.1 to 10 grays—were hemizygous or heterozygous for GPA. A linear relation between dose and frequency of variant red cells was found. The variant cells are apparently progeny of mutated precursors; the mutations appear to be stably integrated into the stem cells. This assay or similar mutagenesis assays may be of use for determining both the radiation exposure history of an individual and the person's likely health risks.

Electrophysiology of sheepish grins

WHAT is the neural basis for the ability of animals to distinguish friendly, threatening, and familiar faces (page 448)? Kendrick and Baldwin showed a series of slides to Dalesbred sheep and concurrently mea-

sured the firing rate of 561 cells in their temporal cortices. The sheep were in a darkened room and were suspended in a canvas hammock; the slides were at eye level and were projected on the screen for 5 seconds. Forty of the tested cells fired at unusual rates in response to faces. Eight brain cells fired when a sheep was shown a slide of the sheep that lived in the next pen. When the sheep saw the face of a horned sheep (those tested all lacked horns), 21 cells fired, and the bigger the horns the bigger the impulse. Nine cells responded to human and sheepdog faces (that may represent threatening stimuli). Two cells responded to any face shown. Horns alone, upside-down faces, and sheep bodies did not elicit responses. These sheep appear to process visual information about faces much as do primates, although monkeys, which sometimes see each other while hanging by their tails, have been found to have cells that respond to faces presented upside down.

New submolecular labeling technique

IT is a golden opportunity for structural biologists: a new labeling procedure makes it feasible to specifically tag submolecular sites on nucleic acids, proteins, and other molecules at closer range than has ever before been possible (page 450). The new tag (cover) is 1/5 to 1/10 the size of labels currently in use. It consists of a complex of 11 gold atoms attached to the Fab' portion of antibody molecules (the portion that binds to specific antigen); the gold does not interfere with the ability of antibody to bind to antigen. The largest dimension in the experimental complexes of antibody fragment plus gold is 5.4 nanometers; this is, thus, also the maximum distance that the label can be from the site of interest. Hainfeld envisions adaptation of the technique for use with many types of antibodies and with conventional electron microscopes (a scanning transmission electron microscope was used in the prototype experiments).

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New Technologies in the Generation of Electricity

The electric utilities are in the later phases of a horrendous experience resulting from their choices and scheduling decisions about generating capacity that were made during the 1970s. They chose to build huge plants and were overly optimistic about growth in demand. Their trauma was exacerbated by problems with nuclear reactors and high interest rates during construction and by the need to curtail acid emissions from coal-fired plants. The time required for design, obtaining permits, and construction of 1000-megawatt (MW) and larger units was 8 to 15 years. During 1987 and 1988 most of the plants now under construction will be completed, and with time, excess capacity will disappear, probably to be followed by shortages.

The capacity requirements of the next decade are uncertain, but new technologies have the potential to forestall many future problems, by providing flexibility in the adding of capacity and freedom from pollution. In the new approach, units of the order of 100-MW capacity will be added in times on the order of 2 or 3 years.

A key technological development is a series of combustion turbines that can run reliably for long periods at high temperatures. One version being tested by General Electric can operate at 1260°C. The heat from the turbine can be used to make steam to drive another turbine.

The combustion turbines can employ natural gas, fuel oil, or CO + H₂ derived from gasification of coal. The utilities see an opportunity for phased addition of increased generating capacity. The first phase would be the installation of 100-MW gas turbine capacity that would use natural gas and serve for peaking purposes. Later the heat recovery and steam turbine would be added to yield another 100 MW. Finally, were natural gas to become too expensive, coal gasifiers could be installed, leading to a total output of 300 MW. One version of the gasification step has been operated successfully for about 3 years at the Cool Water plant in California. Emissions from the plant are pollution-free. The Cool Water unit employs a Texaco gasifier. Both Dow Chemical and Shell have developed their own versions of gasifiers, and other companies have also been active.

A panel discussion at the 2 April annual meeting of the Gas Research Institute in Chicago cited some of the advantages of the use of natural gas in the generation of electricity. Generating facilities can be constructed rapidly. Capital costs of equipment are small. Siting problems are minimal. The generators can be located close to loads, thus cutting transmission losses. There are no emissions of SO₂. These advantages justify use of a fuel whose cost is greater than coal. A major uncertainty is the longer term price of gas after the gas bubble disappears.

The use of co-generation is a growing phenomenon that may come to have a considerable role. At the panel discussion, William T. McCormick of Consumers Power told of a project being developed at Midland, Michigan. There, gas turbines will be used to generate 1300 MW of electricity. Low-temperature heat will be delivered to Dow Chemical to be used in chemical processing. Vendors have guaranteed on-line availability of 85 to 90 percent, which is much better than that of the usual power plant. Overall thermal efficiency will be 43 percent. Were new turbines available that are currently being tested the efficiency would be 47 percent. Many coal-fired power plants operate in the low 30s. Co-generation is likely to have increasing applications in commercial establishments where both electricity and heat are required. Again, high thermal efficiencies can be attained. As an alternative to turbines, electricity can be generated and heat recovered from natural gas by means of fuel cells. This is a technology recently developed under sponsorship of the Gas Research Institute.

There is no question about the versatility of natural gas as an energy source and its potential role in the generation of electricity, the principal question for the future is its price and the quantities available. Present spot prices of about \$1.50 per million BTUs discourage exploration and drilling.

In any event, the electric utilities are embarked on a new and flexible course in their choice of generating equipment.—PHILIP H. ABELSON

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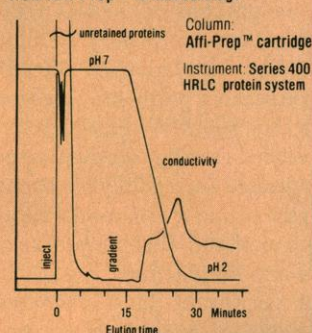
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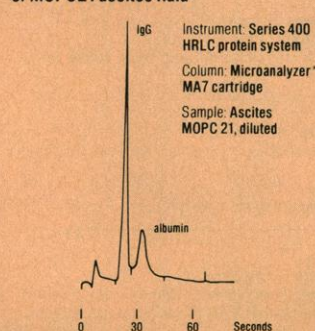
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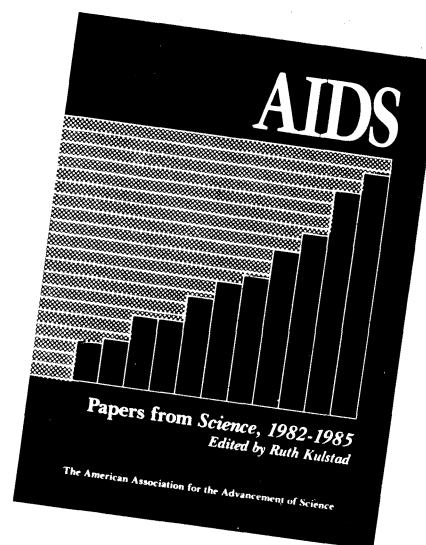
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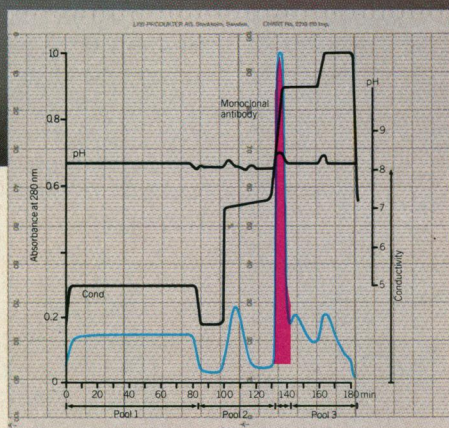
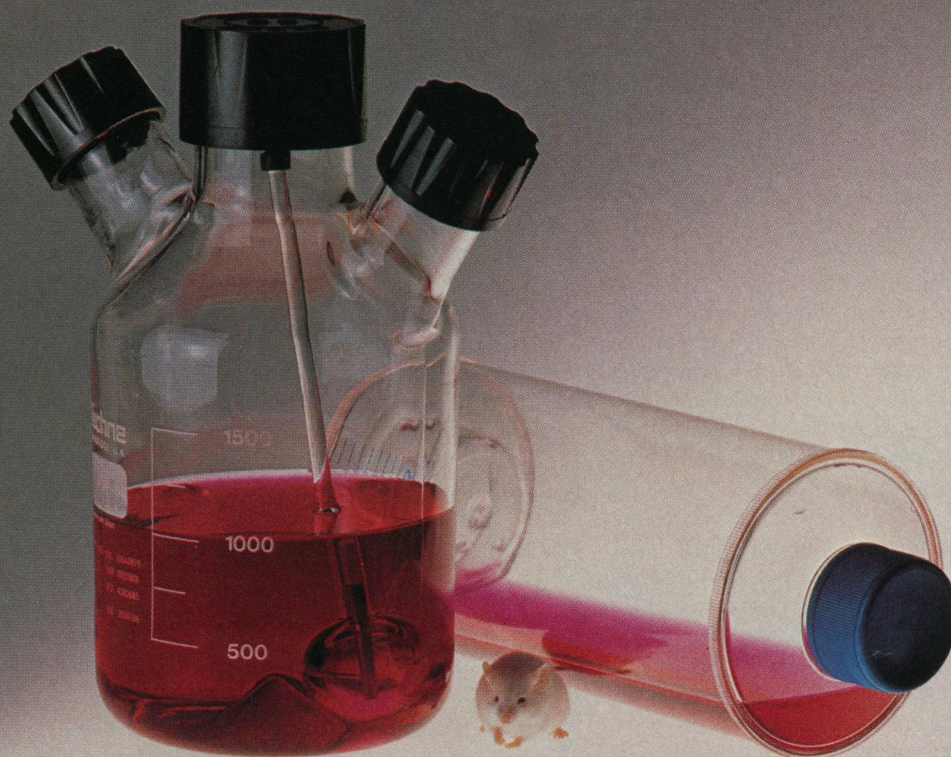
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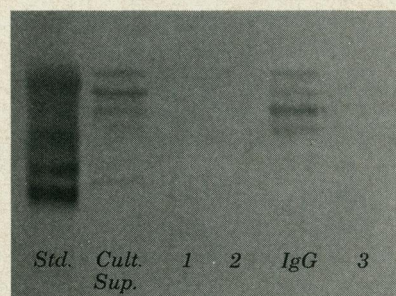
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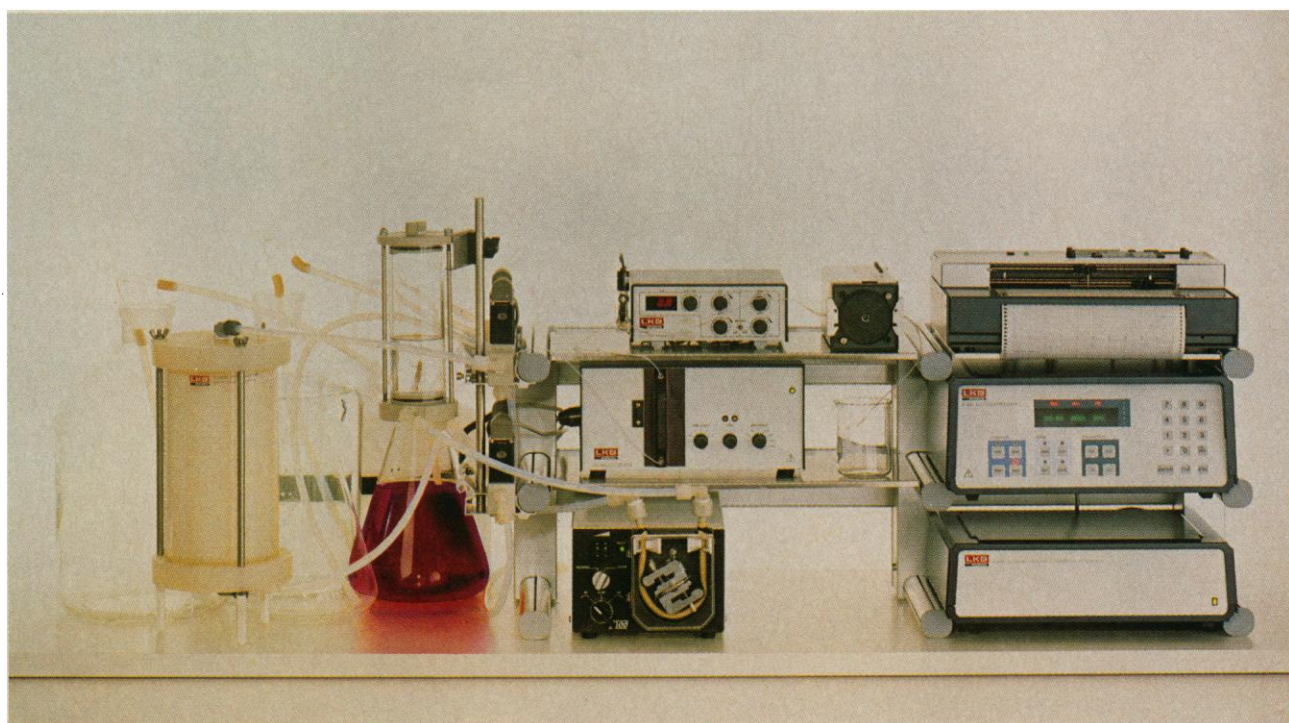
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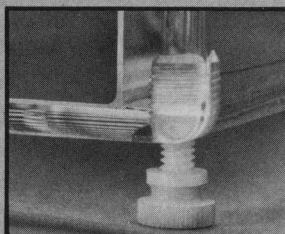
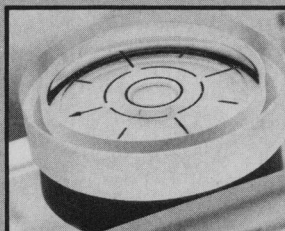
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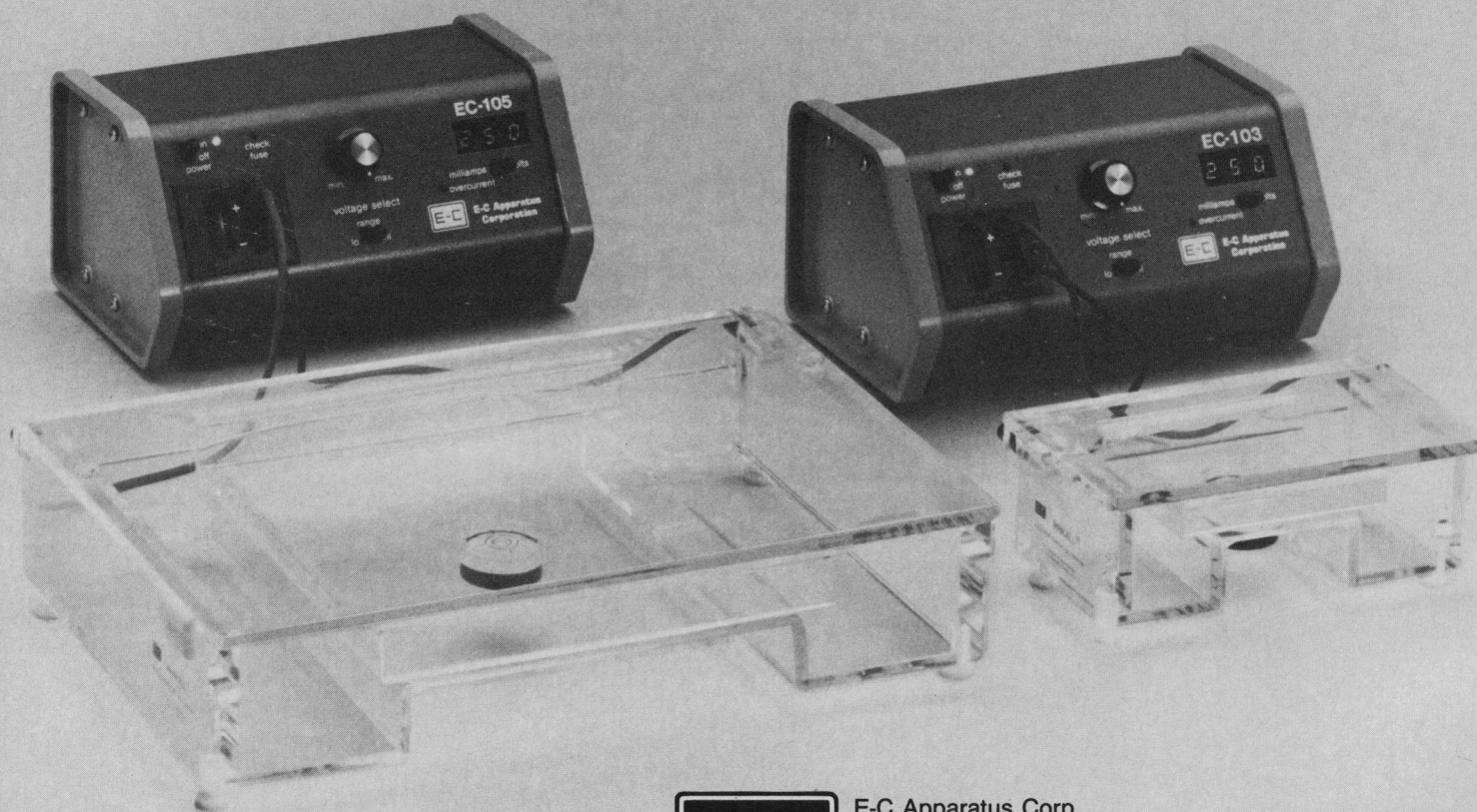


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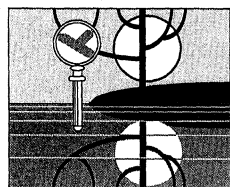
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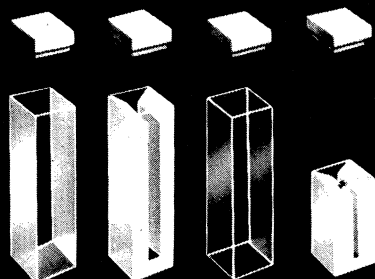
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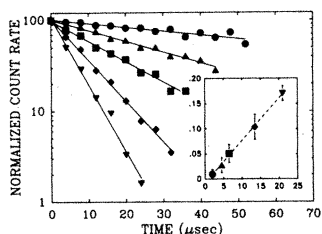
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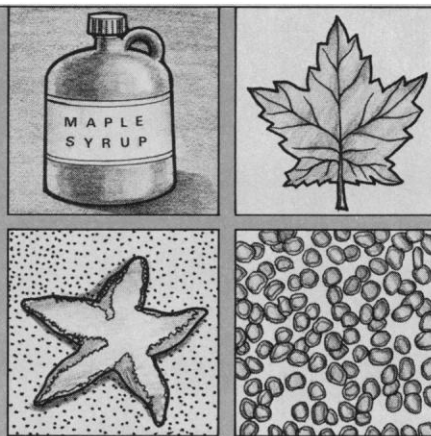
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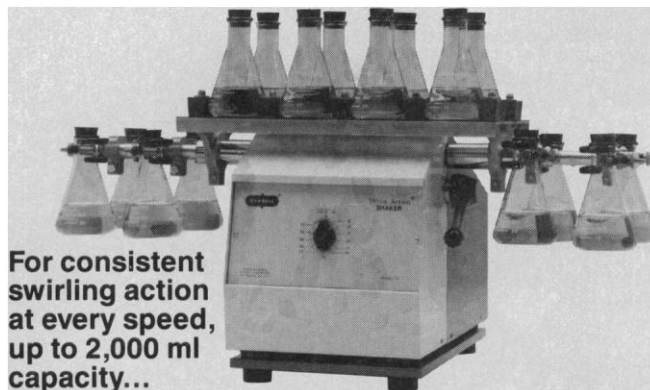
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8:30-8:45 a.m. **WELCOME AND
INTRODUCTION**

Max Link, Ph.D.
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William F. Raub, Ph.D.
Deputy Director, NIH

8:45-10:30 a.m. **Coronary Heart Disease and
Stroke**

Moderators: **Leon E. Rosenberg, M.D.**
Dean, Yale Medical School
Lester B. Salans, M.D.
Vice President, Pre-Clinical
Research
Sandoz Research Institute

10:45-12:15 p.m. **Development of the Hepatitis B
Vaccine**

Moderator: **George Grady, M.D.**
Asst. Commissioner of Laboratories
and Communicable Diseases
State Laboratory Institute
Jamaica Plain, MA

12:15-1:15 p.m. **Lunch**

1:30-2:50 p.m. **End - Stage Renal Disease**

Moderator: **Barry D. Kahan, M.D., Ph.D.**
Division of Immunology and Organ
Transplantation
Department of Surgery
University of Texas Medical School

2:50-3:30 p.m. **Contributions of Basic Research
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Panel Discussion**

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