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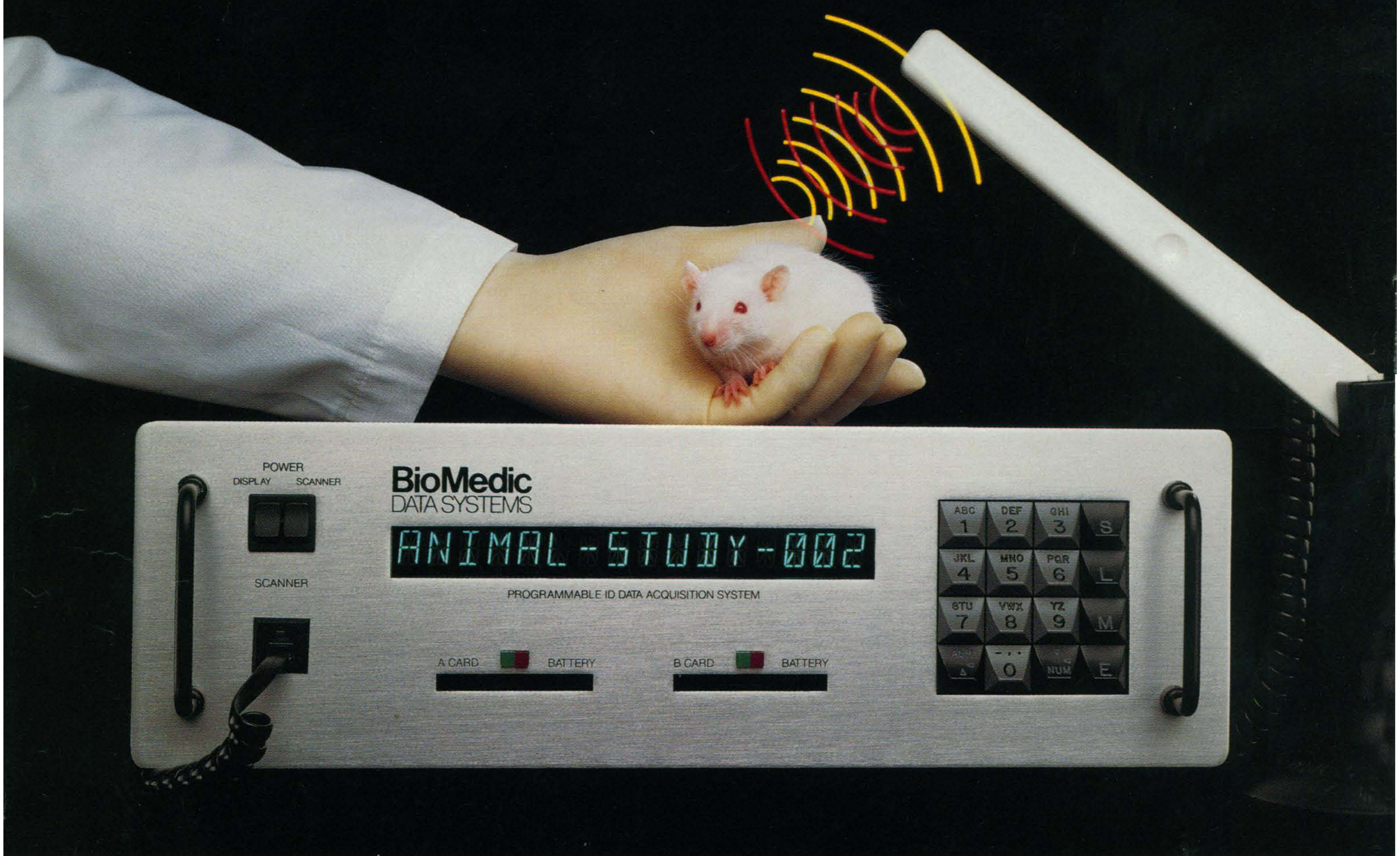
$6.00

(ELAMS™) Electronic Laboratory Animal Monitoring System

When you create a great concept,



Our new Electronic Notebook is added proof that ELAMS is more than a superior animal identification process.

ELAMS is dramatically impacting data collection efficiency, accuracy, quantity and use. The new Bio Medic Data Systems DAS4002, an entirely portable variation and complement to the DAS4001, underscores the acceptance of ELAMS by the research field.

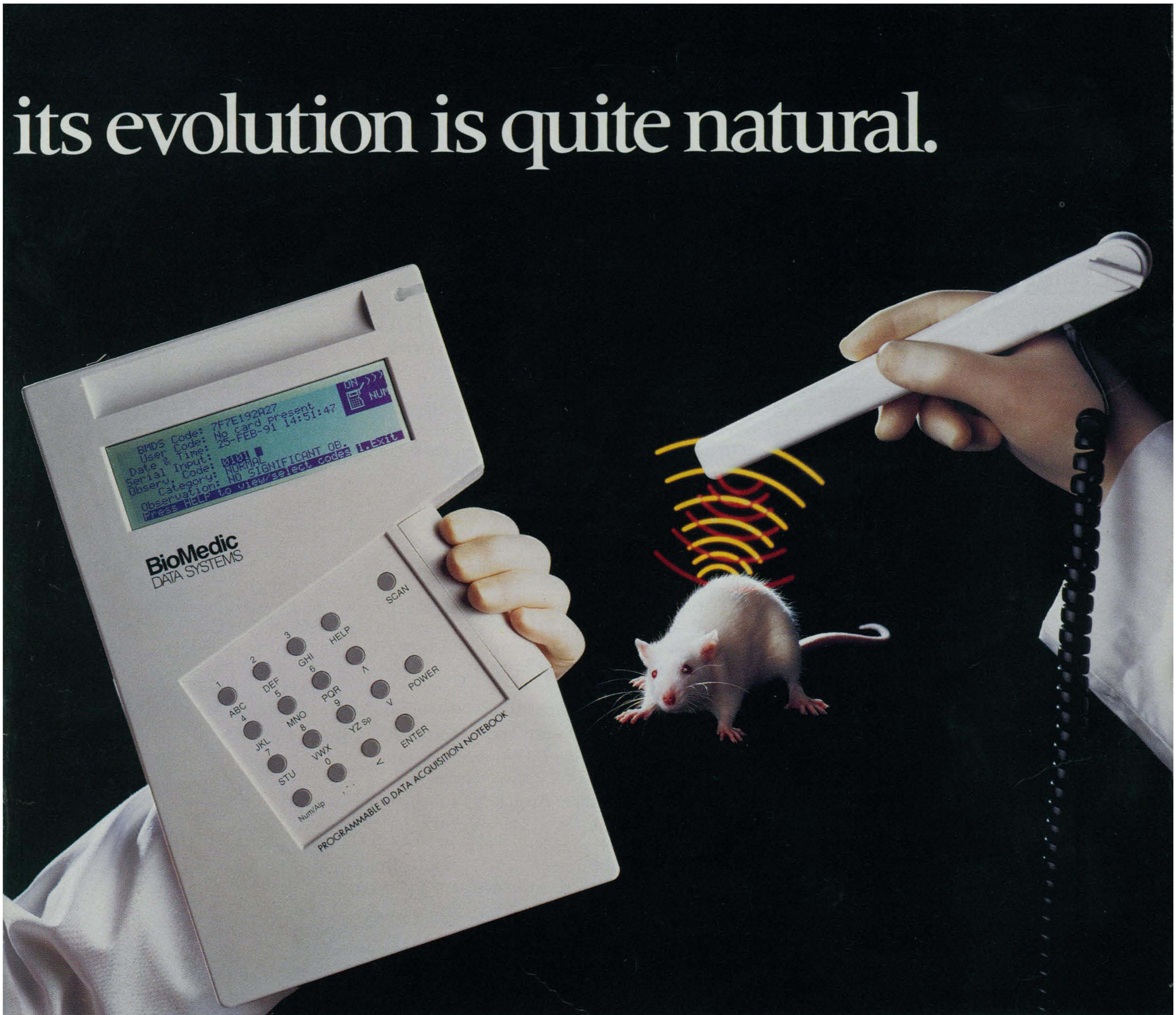
So, what began as a big step ahead in animal identification is turning into a great leap forward in lab animal monitoring and information management.

Why? Because ELAMS does so many things so much better, faster, cleaner, safer and more cost efficiently.

Invaluable Positive Identification

Start with the identification process. Using encoded, subcutaneously implanted microchips (transponders) that are 'read' by an interrogating scanner, ELAMS positive identification renders obsolete the hit-and-miss of tagging, clipping, tattooing, etc. And you can keep and use your present animal codes and read about 100 animals in 20 minutes. It works for all animal species. ELAMS uses patented bio-compatible glass-encased transponders, pre-encoded and conveniently packaged within individual sterile needles, inside an insertion device. Studies and customer usage confirm that animal tissue response is completely non adverse. ELAMS exceeds GLP guidelines.

Secondly, ELAMS provides you with transportable, programmable memory, extending up to 15,000 ID codes on a credit-card sized device. Data can be copied from card to card, or downloaded



to your computer or printer. Conversely, you can update these SRAM cards with ID data from your computer.

The New DAS4002

This new unit combines high-density, low-power circuitry with an integral, high-capacity rechargeable battery for complete portability. It goes anywhere.

Like its parent, the DAS4002 memory can cross-reference your own user codes and store a wealth of monitoring information at the precise moment the animal is scanned. This can include time and date, external input from other devices, and user entered clinical observations relating to the animal's condition.

Again, this new DAS is loaded with safety, security and warning features and sixty different help menus, plus a friendly alphanumeric keyboard and clear LCD display. An array of alternative and optional features is also available.

ELAMS™ technology is making major contributions to pharmaceutical, government, university and contract research. We invite you to learn more about this state-of-the-art system. Just call our toll free number or drop us a line.

A permanently-encoded microchip (shown 1.5x) is the focus of ELAMS, the first and only absolute, positive animal identification system available.

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■ The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

COVER Model of the complex of human growth hormone and the extracellular domain of its receptor. One hormone molecule (red) is bound to two receptor molecules (blue and green); the pebbled yellow surface represents the cell membrane. The dimerization of the extracellular domains by the hormone is likely to aggregate the intracellular domains of the receptor as well, thereby producing signals leading to cell growth differentiation. See page 306. [Graphics by T. Hynes and A. M. de Vos with MIDAS-plus software]

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Book Reviews

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This Week in SCIENCE

Josephson computers

Superconducting Josephson junctions may one day form the basis for ultrafast computers. Hasuo (p. 301) reviews progress that has been made through the use of high-quality niobium junctions. Large-scale integrated circuits have been made that are much faster than existing semiconductor circuits. The first commercial products may be specialized processors and hybrids with existing computers.

Growth hormone and receptor complex

Binding of human growth hormone (hGH) to its receptor stimulates the growth and metabolism of muscle, bone, and cartilage cells; de Vos *et al.* (p. 306; cover) report the x-ray structure of hGH complexed with the extracellular domain of its receptor (hGHbp). Two receptor molecules form the complex with hGH. Although the two hGHbp molecules donate similar residues, the structures of the two binding sites are quite different. The two hGHbp molecules also form extensive carboxyl-terminal contacts, which suggests a sequential mechanism for dimerization that may have implications for signal transduction.

One charge at a time

The ultimate in digital electronics is to use a single electron to change the state of a device; Su *et al.* (p. 313) report the incremental charging of the potential well of a resonant tunneling device by single electrons. In order to separate the effects of size quantization and charging, the submicrometer-sized heterostructure was grown so that one of the barriers of the quantum well was more transparent than the other. When the voltage polarity is chosen so that the emitter was more transparent than the collector, electrons accumulate in the well, and sharp steps are observed in the tunneling current because of Coulomb blockade.

Alkane activation

Measurement of the gas-phase reaction rates for the addition of the normally "unreactive" alkanes to a rhodium complex has verified that these reactions proceed through the formation of a 16-electron intermediate. Wasserman *et al.* (p. 315) irradiated $(\eta^5\text{-}C_5H_5)Rh(CO)_2$ to dissociate one of the CO ligands. Almost every collision of the resulting "naked" complex with alkanes such as neopentane caused activation of carbon–hydrogen (C–H) bonds. In a second step these activated intermediates undergo oxidative addition, breaking the C–H bond.

Cyclic 3' ends

In the major mature form of U6 RNA, one of the small nuclear RNA molecules involved in pre-mRNA splicing, the 3' end has an unusual cyclic 2',3'-phosphate group on a uridyl residue. Lund and Dahlberg (p. 327) identified this apparently post-translational modification through ribonuclease T1 fingerprinting and chemical modification analyses. The formation of the cyclic phosphate may act to inhibit shortening or elongation at the 3' end, thus fixing its length, or may form a transient covalent linkage with another splicesome component.

Coral siblings

Wide distribution, longevity, and clear annual bands of the reef-building coral *Montastrea annularis* has made it the "lab rat" for many ecological, physiological, and geological studies, especially for the poorly understood episodes of coral bleaching. Knowlton *et al.* (p. 330) show that *M. annularis* is really a complex of genetically and morphologically distinct sibling species that differ in important attributes such as coloration and growth rates, a finding that brings into question the widely held assumption that its colony morphology reflects environmental plasticity.

Recognizing more HIVs

Immunization of mice with a recombinant vaccinia virus from one HIV isolate, followed by restimulation of cytotoxic T cells (CTLs) from another isolate with a single substitution at a critical V3 loop residue, generated CTLs with broad specificities. Takahashi *et al.* (p. 333) found that using peptides with aliphatic substitutions at residue 325 during restimulation generated CTLs that could respond to variant sequences at this critical site.

Endosperm evolution

Evidence for the origin of endosperm in flowering plants has been obtained by Friedman (p. 336), who studied the stages of development of the desert shrub *Ephedra* from pollination through formation of cellular protoembryos. Friedman had showed that double fertilization took place in this plant; by serially sectioning 400 ovules, he now shows that the development pattern in *Ephedra* is similar to that in primitive flowering plants, except that the second fertilization product forms additional embryos. This embryo-producing tissue may have evolved into endosperm.

Artificial photoreceptor

Bacteriorhodopsin (bR) films have been used to create image-sensing devices. Miyasaka *et al.* (p. 342; see news story by Flam, p. 289) used Langmuir-Blodgett techniques to coat tin oxide electrodes with bR; the film was covered with an aqueous gel electrolyte and sealed with a gold counterelectrode. These photocells were then constructed into a pixel array to make an image sensor. Like biological photoreceptors, the photocells produce a rectified photocurrent. A constant light intensity produces a rapidly rising photocurrent that peaks and rapidly returns to background. Such response would be useful in optical imaging applications.

EDITED BY PHILLIP D. SZUROMI

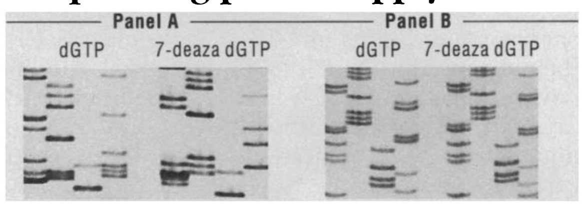
Introducing the StrataTherm™ Temperature Controller

Now you can obtain the benefits of temperature regulation for the same price as a conventional sequencing power supply.

Conventional sequencing gels are routinely electrophoresed at temperatures of 40°C to 50°C. Higher temperature electrophoresis is not generally recommended as temperature fluctuations result in plate cracking. With certain sequences, some secondary DNA structures do not fully denature at 50°C, despite the presence of formamide in the loading dye and urea in the gel matrix. Undenatured secondary structures result in compressed bands and loss of sequence information. The elimination of temperature fluctuation during high temperature gel electrophoresis allows resolution of compressed bands without plate cracking.

The StrataTherm™ temperature controller is designed to maintain a constant gel temperature between 30°C and 90°C automatically. The StrataTherm temperature controller permits electrophoresis at high temperatures by regulating voltage automatically to ensure a constant gel temperature. In addition, high temperature electrophoresis significantly reduces the combined prewarm and run time. The StrataTherm temperature controller is specifically designed for use in conjunction with the FeatherVolt™ 3000 volt, 100mA power supply*. It can be used with most sequencing gel tanks that maintain even heat distribution.

The StrataTherm temperature controller is also useful for studies involving hairpin analysis of mutant PCR* fragments.



Resolution of compressed DNA at higher temperatures using the StrataTherm temperature controller.
ssM13 DNA was sequenced with dGTP or 7-deaza dGTP and electrophoresed on a 33cm 6% acrylamide gel maintained at constant temperature. Panel A: 40°C; panel B: 55°C.

Temp	Run Time	Mean Voltage
40°C	90 min.	1700 volts
55°C	50 min.	1900 volts

Table #1. Reduction in gel prewarming time and gel run time using the StrataTherm temperature controller.
Gels were prewarmed at 150 watts (W), 2500 volts (V). After reaching the specified temperature, the voltage was regulated by the StrataTherm temperature controller. Electrophoresis times (bromophenol blue dye to the bottom of the gel) are shown.

	Catalog#
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* The polymerase chain reaction (PCR) process is covered by patents issued to Cetus Corporation.

* Patents Pending

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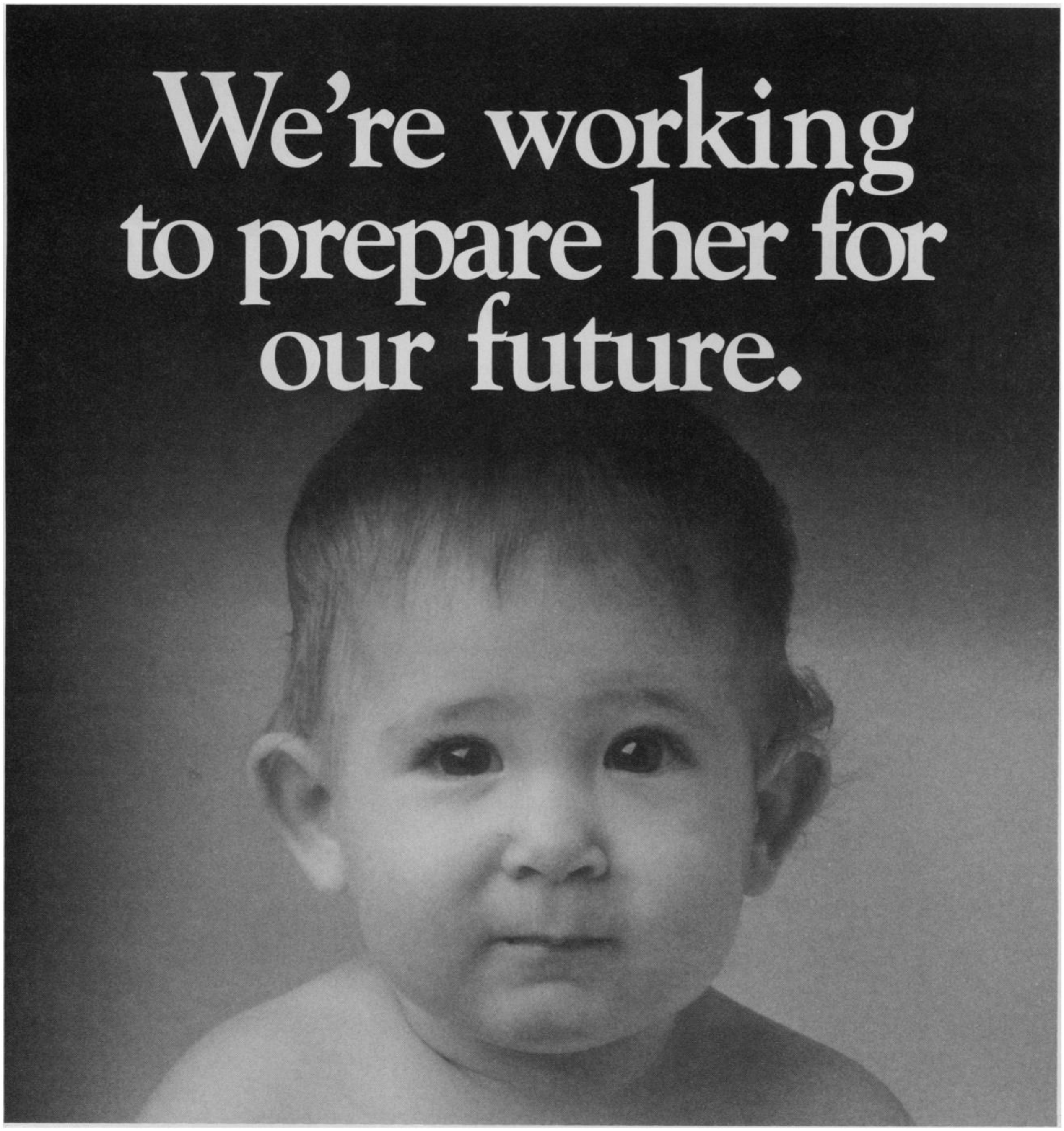

Children are our greatest hope. Their education is our greatest concern.

At the American Association for the Advancement of Science we're investing in our future with Project 2061.

This national program, sponsored by the AAAS, is designed as a blueprint for science education. Project 2061 is based on the premise that students learn best when connections are made between fundamental scientific theories and real-life applications. From rural Georgia to San Francisco; from Philadelphia to suburban Wisconsin, the AAAS is working with teachers to design the science curriculum of the future.

Although just a beginning, AAAS and its members are not only dedicated to the advancement of science today, but through Project 2061 and other educational programs, to the continual advancement of science in years to come.

Project 2061 SM

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