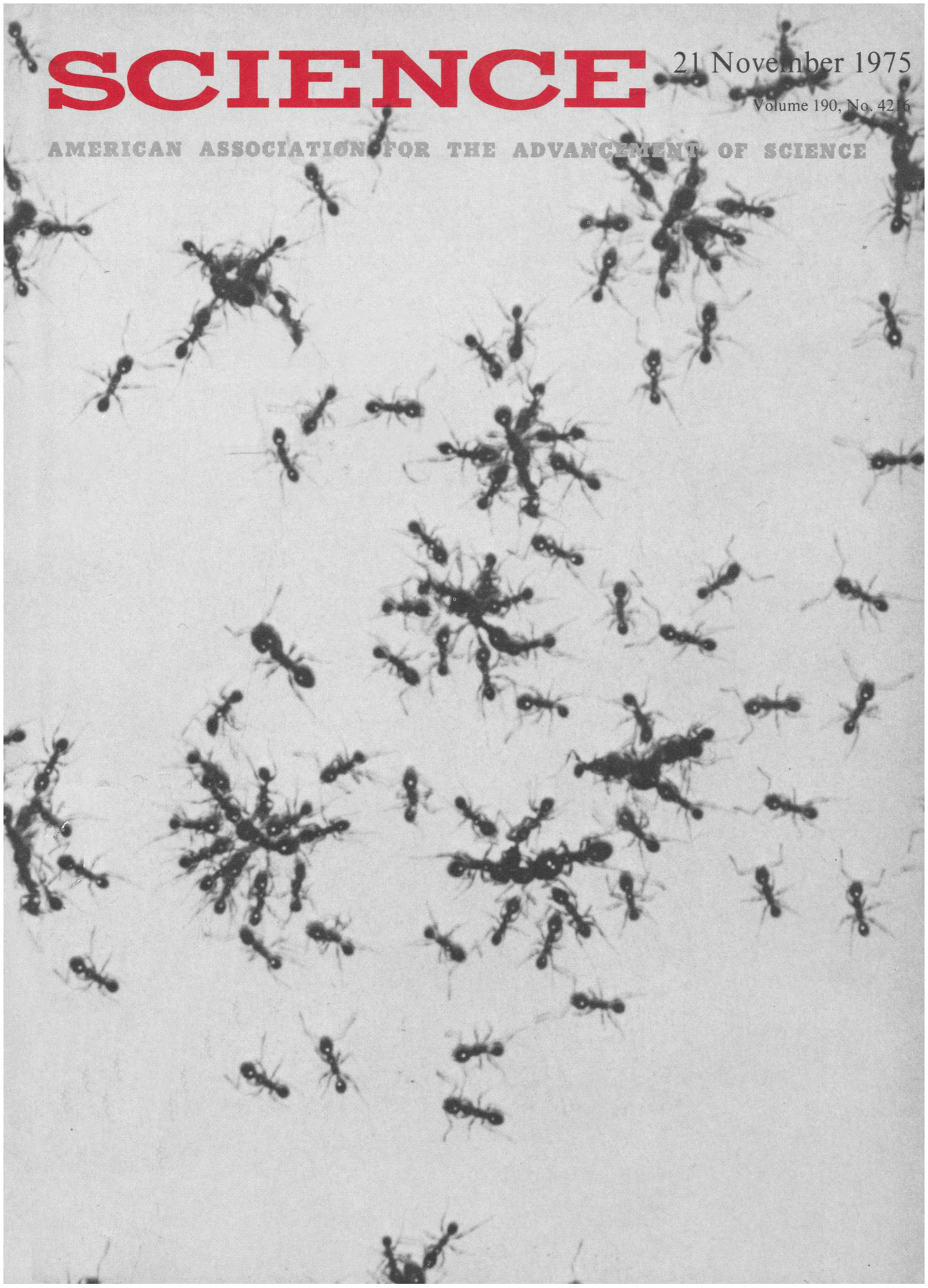
SCIENCE

21 November 1975

Volume 190, No. 4216

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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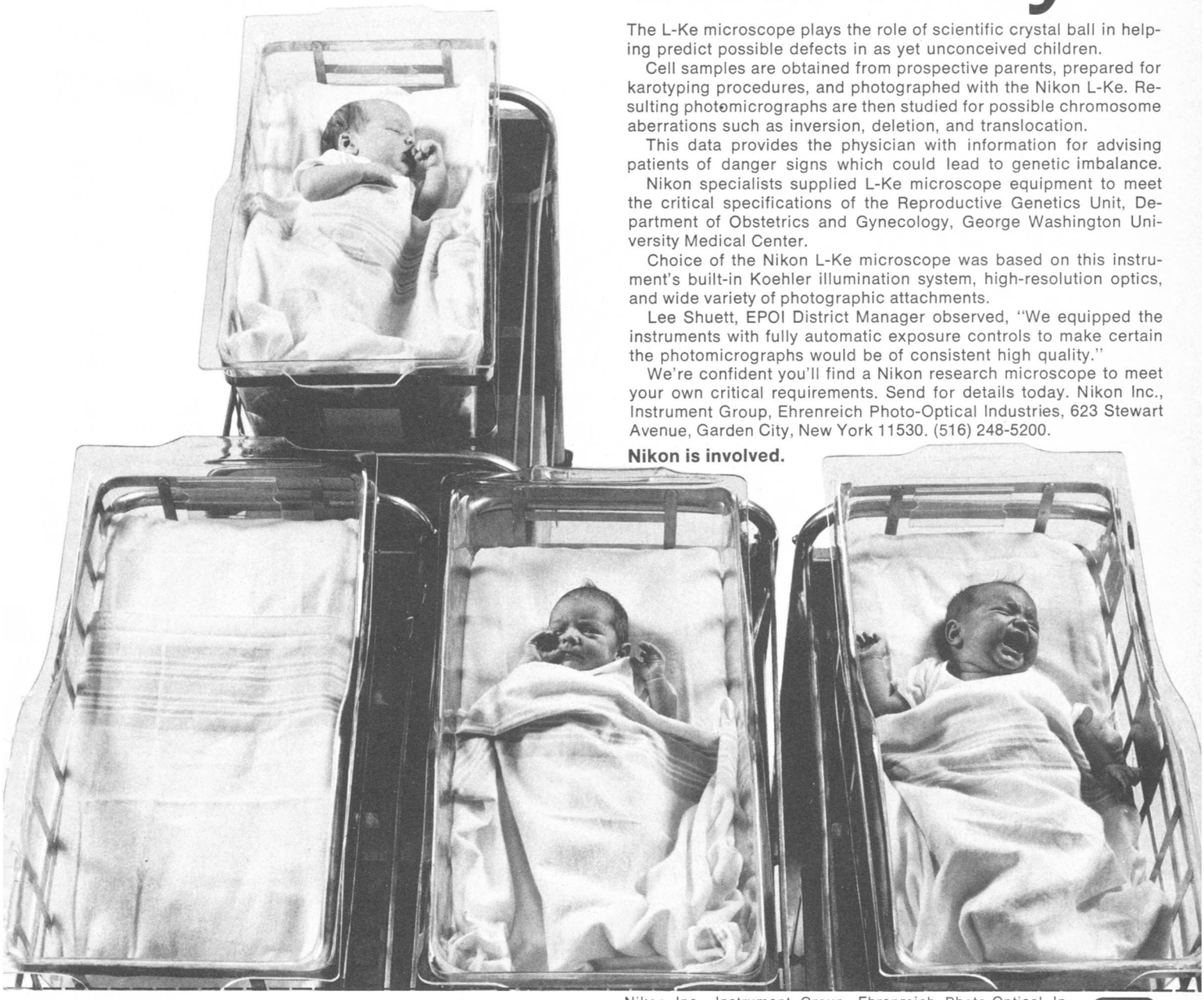
Nikon looks into a future baby.



The L-Ke microscope plays the role of scientific crystal ball in helping predict possible defects in as yet unconceived children.

Cell samples are obtained from prospective parents, prepared for karotyping procedures, and photographed with the Nikon L-Ke. Resulting photomicrographs are then studied for possible chromosome aberrations such as inversion, deletion, and translocation.

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Nikon specialists supplied L-Ke microscope equipment to meet the critical specifications of the Reproductive Genetics Unit, Department of Obstetrics and Gynecology, George Washington University Medical Center.

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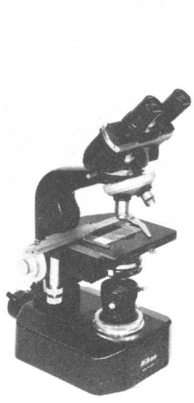
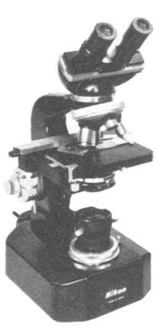
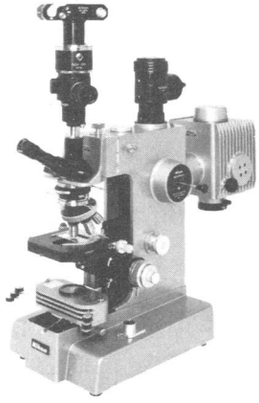
Nikon is involved.



Nikon L-Ke



Nikon S-Ke



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S-11-21-75

21 November 1975

Volume 190, No. 4216

SCIENCE

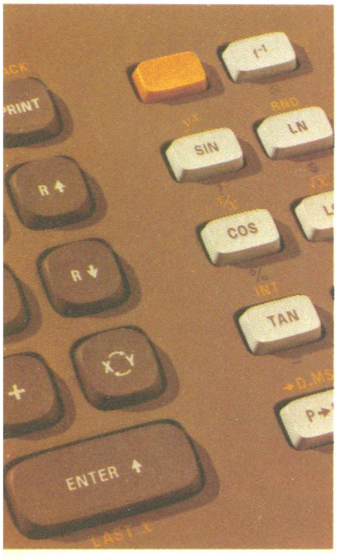
SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly. Second-class postage paid at Washington, D.C. and additional entry. Member rates on request. Annual subscription $50; foreign postage: Americas $7, overseas $8, air lift to Europe $30. Single copies $2 (back issues $3) except Food Issue (9 May 1975) is $3 and **Guide to Scientific Instruments** is $6. School year subscription: 9 months $37.50; 10 months $41.75. Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. **Science is indexed in the Reader's Guide to Periodical Literature.**

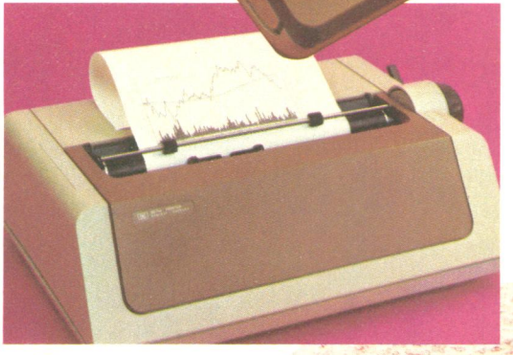
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

COVER

During a territorial battle, minor workers of the ant, *Pheidole dentata*, surround and pinion invading workers of a second, larger species of ant, *Tetramorium caespitum*. This action is the initial tactic used by the *Pheidole* colonies against most species of invading ants. See page 798. [A. H. Coleman, Harvard University, Cambridge, Massachusetts]





◂ ***Also new from HP:*** *The HP 9871 Page-width Printer/Plotter. Its unique bi-directional platen and 96-character printing disk let you run program-formulated charts and graphs; tables and text. Works with all HP 9800 series computing calculators.*

Announcing the HP9815. Look what your bucks will buy now.

High-speed data cartridge provides up to 96,384 bytes of program and data storage. Dual-track, 140 foot magnetic tape can be searched bi-directionally at 60 inches a second.

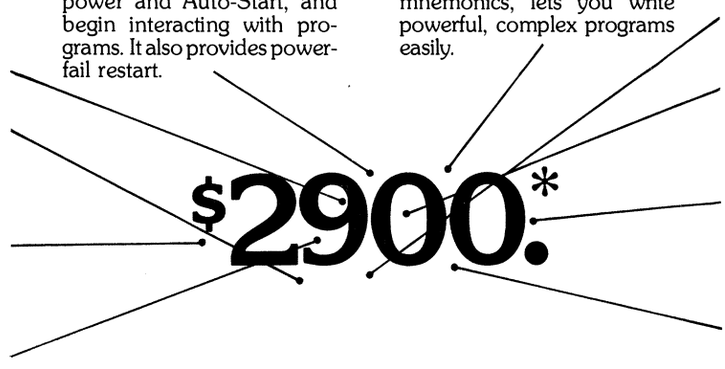
Thermal printer has full set of alphanumeric characters. Prints up to 16 characters per line at 2.8 lines a second.

Easy-on-the-eyes display can display up to 16 numeric characters or up to 10 digits in scientific notation.

15 user definable keys allow single keystroke execution of programmed routines.

Auto-Start switch initializes programs so an operator need only switch on the power and Auto-Start, and begin interacting with programs. It also provides power-fail restart.

Simplified programming, based on easy-to-understand logic and easy-to-remember mnemonics, lets you write powerful, complex programs easily.



Powerful editing features allow you to modify and update programs quickly and accurately.

Built-in math and trig functions provide simple, convenient keystroke calculations—just like you get from HP hand-held calculators.

HP stack-oriented notation is the efficient, powerful method for arithmetic operations. It reduces equations to a few easily-handled steps.

Compact and portable, the 13 pound HP 9815 is just 13½" x 13½" x 4".

*U.S. domestic price only. Does not include options, programs or peripherals.

And that's just for starters.

At its base-price, the new HP 9815 computing calculator is a price/performance leader. And the powerful 9815 becomes a uniquely versatile performer as you add optional features.

Interfacing capability is provided through an optional $200* two-channel I/O module. It allows a choice of seven different HP peripherals to work with the 9815, including the new 9871 page printer. You just plug them in, and they're ready to go. HP interface cards and cables allow the 9815 to control, gather and process data from a variety of instruments. And by adding an HP-Interface Bus, up to 14 instruments can be monitored simultaneously.

HP general-purpose programs are now available for statistics, electrical engineering design, surveying and radioimmunoassay. With them, problem solving is reduced to data entry.

Power, versatility, simplicity, low-cost—these are the characteristics of the new 9815. We call it a four-dimensional machine. Call your local HP sales office, or write for a copy of the HP 9815 brochure, and you'll see why.

HP computing calculators put the power where the problems are.

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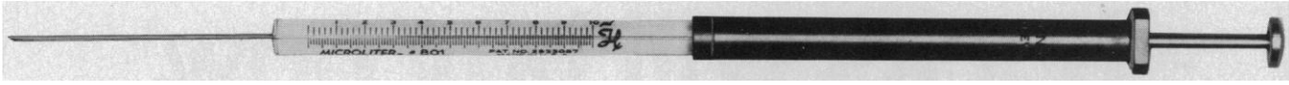
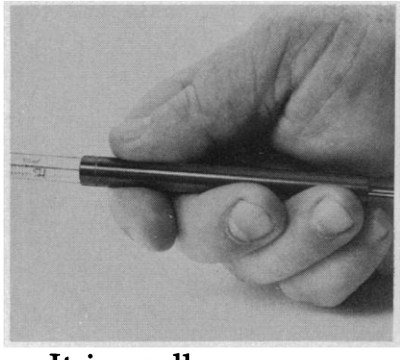
A handle on a syringe comes in handy.



If you've never considered the construction of a syringe, this syringe might look a little awkward. But it's far from it.

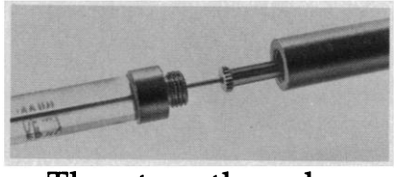


It is really comfortable to hold and convenient to use a syringe with a metal handle. The weight balances nicely in your hand and allows you to hold the syringe without the heat of your body affecting the sample.

The flange in the handle contains a friction ring that gives you an adjustable drag on the stem — plunger, providing resistance against high pressure inlets.

Prevents the bends

Another major attraction of the metal handle is that it practically eliminates plunger bending. A heavy metal stem travels through the handle and acts as a sturdy guide for the smaller plunger.



The stem threads onto the plunger, stabilizing it and helping to prevent the plunger from bending.

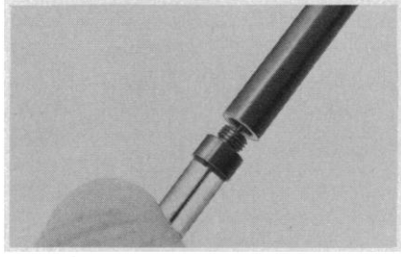
The same old precision

These syringes are essentially the tried and true Hamilton 700 Series Syringes, with accurate delivery to ±1%.

We've just added the metal handle to make them more convenient and versatile.

It's easy to change syringes

If you damage the glass, needle or plunger, you don't have to throw the whole syringe away. Just replace the syringe assembly.



The glass barrel threads into the metal handle to give you a solid connection. It's easy to make replacements.

The syringe with a handle. It comes in 5 μl and 10 μl capacities, with a fixed needle or a replaceable needle. They're available from authorized dealers. For more information and literature on our 800 Series Syringes, write to John Nadolny, Hamilton Company, Post Office Box 10030, Reno, Nevada 89510.

HAMILTON SYRINGES

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Our liquid scintillation leadership line keeps growing.

As the leader in fine LS counting systems, we could probably rest on our state-of-the-art laurels. But we don't think that way.

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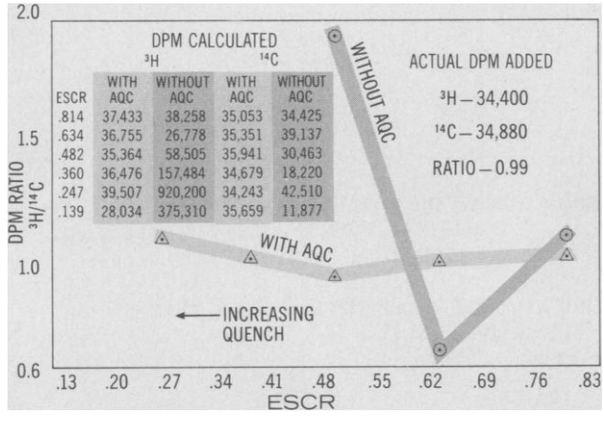
But take some examples of Series 3100 optional modularity:

If you do dual-label sampling, for instance, our Automatic Quench Compensation accessory adjusts instrument gain for the level of quench present in the counting vial measured by the External Standard Channels Ratio method. The result: a far more reliable DPM number (see graph).



If prospective user volume is a concern, add our multiple-user accessory and have 12 additional windows for single-, dual-, or triple-label experiments.

And you have a choice of output mode: an exceptionally quiet basic printer, or a teletype interface.

Series 3100. The modular LS system you personally design for greatest flexibility at the best price.

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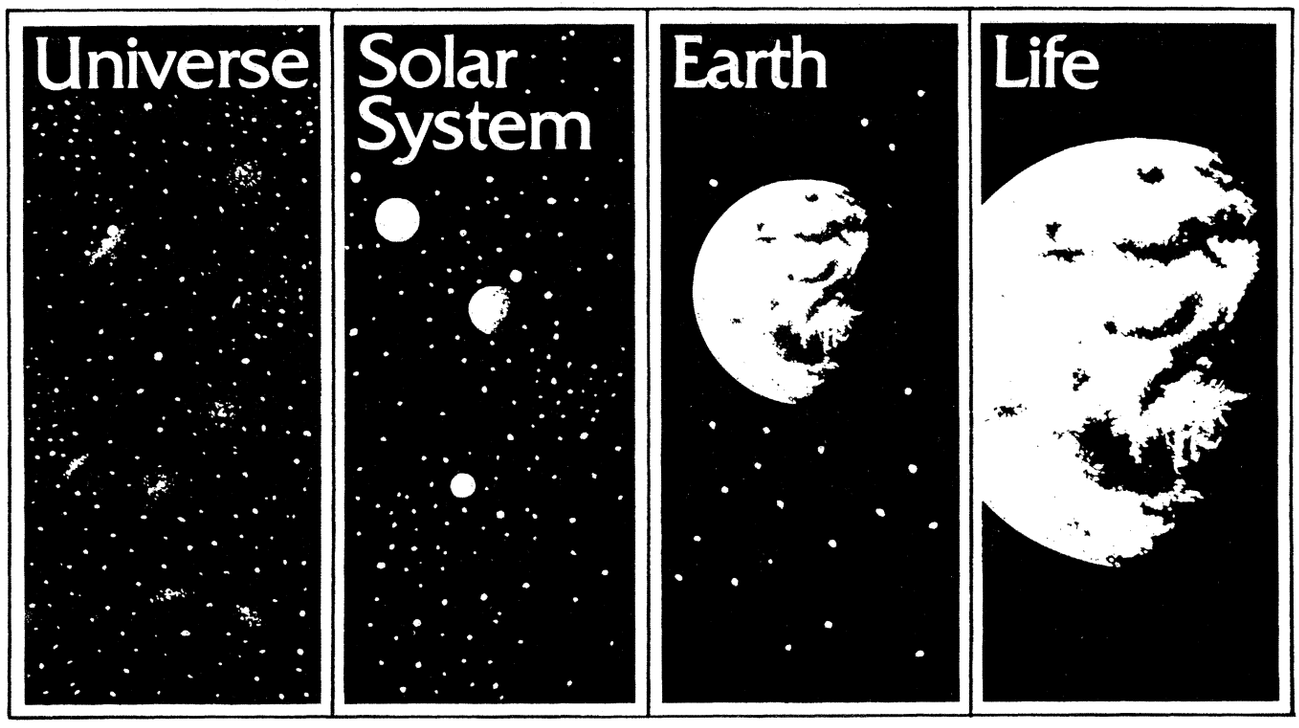
Origins:

Speculations and facts on the sources of planets, Earth, and life by Robert Jastrow, Philip Morrison, Cyril Ponnamperuma, George Wald.



What is man's deepest mystery? Perhaps it is his own origin and that of his world. How did life begin? Where? . . . How did primitive life evolve into man? . . . How did the earth form? . . . How was the universe created? . . . What of the genesis, life, and death of stars? . . . What do pulsars and quasars signify? How were elements created?

Four of the world's leading scientists probe these questions in ORIGINS. They talk of experiments that recreate the conditions for life . . . speculations on the forces of evolution . . . clues to life origins found in meteorites . . . the underlying order in the chaotic formation of stars and solar systems . . . the search for the true age of the earth.

The quest to understand our beginnings is an eternal one. We've used our intuition, our reasoning ability, and the steady accumulation of scientific tools to follow that quest. Through these four talks, the listener learns how far we've come, what we now understand, and where we have to go.

ORIGINS is an attractive album with four 50-minute cassettes and an accompanying booklet. Ideas, facts, and speculations are given in layman's language—just as they were originally given in public lectures in Washington, D.C.

This album is ideal for the inquisitive mind that wants to understand the nature of stars, the universe, the earth, and life. For the science student, ORIGINS shows how scientific method and tools—those of chemistry, physics, astronomy and geology—can be applied to this basic mystery. And for everyone, ORIGINS is the opportunity to listen to scientific work-in-progress.

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Cyril Ponnamperuma, University of Maryland

INTELLIGENT LIFE BEYOND THE UNIVERSE
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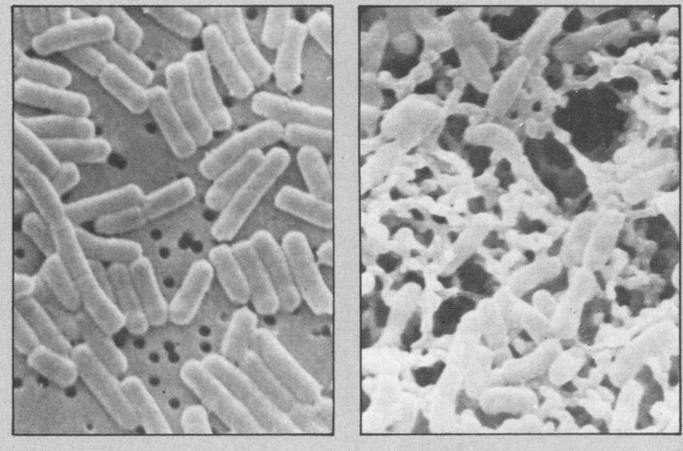
The SEM doesn't lie!

(It proves superiority of Uni-Pore™ membranes from Bio-Rad)

The advantages of membrane filtration for preparing specimens for scanning electron microscopy and transmission electron microscopy have long been established.

But what type of membrane system provides the best results—for bacterial cells, viruses or any particulate matter you want to see clearly?

We think the SEM micrographs on this page dramatically illustrate the superiority of Uni-Pore polycarbonate membranes from Bio-Rad, compared to the cellulose type.



Scanning electron micrographs of *Bacillus subtilis,* 5000X, on 0.4 μm pore size polycarbonate membrane on the left and a standard 0.45 μm pore size cellulosic membrane on the right.

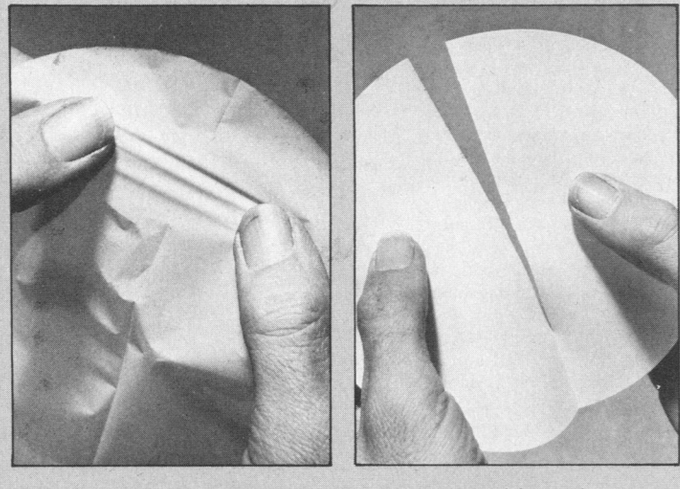
Note the uniform pores of the 0.4 μm Uni-Pore membrane on the left. Almost as if it were drilled. And note the smooth, flat counter-like surface which provides the ideal specimen background for SEM and TEM analysis. It's also a surface that will give you virtually 100% recovery, because there are no fibrous "briar patches" to grip and hold your material.

Quite a contrast to the rough, tortuous paths of the 0.45 μm pore size cellulosic filter at the right. The differences in filter thickness—10 μm for the Uni-Pore vs. 150 μm for the cellulosic filter—means lower and more uniform tare weights for Uni-Pore filters.

In addition to their precise pore geometry, thinness and smooth surfaces, Uni-Pore membranes offer superior strength (bend 'em, fold 'em) and chemical/thermal stability compared to other types of filters

Available in pore sizes from 8.0 down to 0.015 μm, in discs from 13 to 293 mm, in sheets and in filter cartridges. Bulletin 1036 describes Uni-Pore membrane filters in detail, including applications for virus purification and concentration, exfoliative cytology, particulate analysis, chemotaxis and many other uses.

Send for your copy by circling the reader service card or writing directly to Bio-Rad.



Uni-Pore membranes can be bent and folded without damage as shown in photo on the left. Cellulosic membranes crack and break under the same treatment as shown in photo on the right.

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LETTERS

Availability of Grant Applications

A year ago, the District of Columbia Court of Appeals ruled that, since "a noncommercial scientist's research design is not literally a trade secret or item of commercial information," scientists' grant applications to governmental agencies [for example, the National Institutes of Health (NIH), the National Institute of Mental Health (NIMH), and the National Science Foundation] are not exempt from disclosure under the Freedom of Information Act (News and Comment, 15 Nov. 1974, p. 614). This decision raises important questions for the scientific community. For example, if scientists generally avail themselves of their legal right to obtain copies of their colleagues' grant applications, will applicants include less information in their applications, thus making it more difficult for study sections to evaluate them? Will colleagues with shared scientific goals tend to become secretive competitors, and will meaningful scientific exchange be reduced?

NIH has received several hundred requests for copies of grant applications, including recently two from members of the NIH intramural scientific staff. These latter two requests, together with the more general implications of the court decision, prompted the Inter-Assembly Council of the Assemblies of Scientists of NIH and NIMH (*1*) to transmit the following memorandum to the intramural scientific research staffs of NIH and NIMH. (It should be emphasized that the intramural staff are not involved in the grants process, either as applicants or administrators, and that, before the court decision, they did not have, nor seek, grant applications.)

As you know, applications for Research Grants have always been considered by the National Institutes of Health and the National Institute of Mental Health to be privileged documents. No scientist, either in or out of government, has had access to them other than the members and consultants of the relevant scientific review panels. Now, as required by the Freedom of Information Act, NIH and NIMH will make available upon proper request any and all approved and funded Grant Applications after informing the principal investigator and the applicant institution in the course of deleting any potentially patentable material. Renewal applications will similarly be made available prior to approval since they are considered to be continuations of previously approved and funded grants.

The Inter-Assembly Council of the Assemblies of Scientists of the National Institutes of Health and National Institute of Mental Health, while fully recognizing the legal right of scientists to make such a request, strongly urges that NIH and NIMH Intramural scientists voluntarily continue to act according to past practice and not request copies of Grant Applications. We advocate this policy because we fear the effectiveness of the Peer Review system may be diminished and biomedical research impeded if applicants believe their Grant Applications will be widely circulated.

This recommendation is subject to revision should professional scientific societies adopt appropriate guidelines.

We suggest that all scientists adopt a similar policy and urge the professional scientific societies to consider the ethical questions raised by, and the practical consequences of, the availability of grant applications under the Freedom of Information Act (*1*).

EDWARD D. KORN
Inter-Assembly Council NIH-NIMH, National Institutes of Health, Bethesda, Maryland 20014

Notes

1. The intramural research scientists of all but one of the constituent institutes of NIH and NIMH have organized themselves into assemblies of scientists (roughly analogous to faculty senates); the Inter-Assembly Council consists of approximately 75 delegates from these Institute assemblies.

Earthquake Damage

The article by Page, Blume, and Joyner "Earthquake shaking and damage to buildings" (22 Aug., p. 601) gives an excellent description of earthquake damage that might be expected in the San Francisco area of California. However, potential earthquake damage in other parts of the country where construction is also governed by the Uniform Building Code cannot be inferred from Page *et al.*'s discussion of the Bay area. Unfortunately, the code is not applied as uniformly as its name implies. For example, Indiana has recently adopted the Uniform Building Code without its earthquake requirements, in spite of the fact that (indeed because) a part of the state is in zone 3, the zone of highest risk of damage. Different parts of the country may have compensating design criteria, such as those that relate to lateral loads due to winds. However, the general lack of appreciation of the dynamic character and damage that can be caused by seismically induced loads may result in a rather grim picture should large earthquakes like the Mississippi Valley (New Madrid) earthquakes of 1811–1812 or the Charleston, South Carolina, earthquake of 1886 reoccur in areas where seismic code provisions are not applied.

ANSHEL J. SCHIFF
School of Mechanical Engineering, Purdue University, West Lafayette, Indiana 47907

We share the concern that extensive and serious earthquake damage may occur in seismically active parts of the country in which the Uniform Building Code has

been adopted but without the earthquake design provisions. A small part of Indiana lies within the zone of highest risk of earthquake damage, as defined in the Seismic Zone Map of the United States contained in the Uniform Building Code. The map, however, is based primarily on the maximum seismic intensities in the historical record without regard to the frequency of occurrence. Indiana is shown in the same zone as coastal California, but the frequency of damaging earthquakes has been much higher in coastal California. Some future edition of the code will likely contain an improved seismic zone map. In the meantime, adoption and enforcement of reasonable earthquake regulations, perhaps less stringent than those applied in California, could greatly reduce potential earthquake damage in areas of known earthquake occurrence outside the western United States.

ROBERT A. PAGE
WILLIAM B. JOYNER
Office of Earthquake Studies,
U.S. Geological Survey,
Menlo Park, California 94025
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Mirror Making

Nicholas Wade's article "Zen and the art of big mirror making" (News and Comment, 10 Oct., p. 132) admirably conveys the consistent dependence of optical astronomy upon the judgments and manual skills of craftsmen. However, there are two statements in the article that are misleading. Glass-ceramics are described as "materials whose thermal coefficient of expansion is magically near zero," and Corning's material is called "Ultra Low Expansion Quartz." Neither statement is correct. The Corning material is prepared by flame hydrolysis from halides of titanium and silica in such proportions that the condensate is a true solution of TiO_2 in SiO_2 (*1*). Quartz plays no part in this process, either as a raw material or as a characterization of the final product, which is completely amorphous, that is, a glass and not a glass-ceramic.

"Magically" near-zero thermal expansion coefficients are not an intrinsic property of glass-ceramics, many of which have high expansion coefficients; nor is a near-zero coefficient unusual or unexpected in glasses. Indeed, data from the University of Arizona Optical Sciences Center (*2*) indicate that, between 0° and 300°C, the expected dimensional change of a ULE™ glass mirror will be less than one-third the dimensional change in a Cer-Vit mirror, since the measured excursions in this temperature range are, respectively, 9×10^{-8}/°C and 32×10^{-8}/°C.

DORIS L. EVANS
Research & Development Laboratories,
Corning Glass Works,
Corning, New York 14830

References

1. D. L. Evans, *J. Am. Ceram. Soc.* **53**, 7 (1970).
2. S. F. Jacobs, A. J. Malvick, J. Berthold III, in *Applied Optics Research Report, 3rd Quarter, FY-72* (Optical Sciences Center, Univ. of Arizona, Phoenix, 1972), pp. 18–22.

Cholesterol in Eggs

Although to our knowledge no evidence is available in the scientific literature, recent releases in the popular press infer that eggs laid by the Araucana fowl ("Easter egg chicken") are lower in cholesterol than eggs routinely available to the consumer. As a result, individuals have been eating Araucana eggs in an effort to lower their intake of dietary cholesterol.

At a recent meeting of the technical committee of the Southern Regional Poultry Breeding Project, data on the cholesterol content of eggs laid by various populations of Araucana fowl were discussed. In no instance was the cholesterol content of Araucana eggs found to be lower than that of eggs laid by strains of domestic fowl. We believe that these data, the result of independent studies at six separate laboratories, provide evidence to disprove the myth that low cholesterol levels are found in eggs from the Araucana fowl.

R. G. SOMES, JR.
Department of Nutritional Sciences,
University of Connecticut,
Storrs 06268
K. W. WASHBURN
Department of Poultry Science,
University of Georgia,
Athens 30601
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Department of Poultry Science,
Virginia Polytechnic Institute and
State University, Blacksburg 24061

21 November 1975, Volume 190, Number 4216 **SCIENCE**

Budget Priorities: Science a Big Loser?

This is the season for falling leaves, quick frosts, and budget making. In the bastions of the Old Executive Office Building close by the White House, the lights burn late as President Ford's next budget is painfully assembled. Secrecy reigns, as it always has.

But for budget watchers there are ominous clues to what may happen. Policymakers in the Administration, confronted by spectacular deficits and promised tax reduction, are striving desperately to stem the rise in spending. In ranking priorities when shares of the budget must be rationed, federal agencies tend to see science as "soft" and discretionary—a view too often echoed in the White House and the Executive Office. Thus, as the Office of Management and Budget passes sentence on the agencies' requests, funds for scientific research now stand in jeopardy. The early signs say, in fact, that science is in a good deal of trouble. Basic research, for which federal support has already declined by nearly 20 percent since 1967, is in the most trouble, and matters have been made worse by the punishment meted out to the National Science Foundation's current research budget by Congress.

If scientists have difficulty understanding politics, it is little wonder. A few weeks ago, at the presentation of the National Medals of Science in the East Room, this year's Honors List heard glowing tributes to science. And a few weeks hence there will be a bill-signing ceremony heralding the triumphant return of a Science Adviser to the White House. The budgetary earthquake will soon follow. Medals and advisers may prettify science, but they do not compensate for weakened research capacity and crippled potential.

At this early stage in decision-making on the new budget, not everything is clear. However, indications are that research which is not mission-related—that is, directly and closely germane to agency assignments—will suffer. University-based research is likely to be squeezed out in favor of work in government research and development centers. All this may be meant to be a strategy for maximizing research efficiency and payoff on the budget dollar. It may also be seen as a way to inject more conservatism into the selection of research projects. If this is how the script is being written, its emphasis is on management criteria at the expense of scientific choice. For much of this, science can thank the political critics who have spent so much time ambushing and ridiculing research projects with titles that are easy to burlesque.

Science cannot expect to be exempted from all the consequences of the government's fiscal crises. But neither is it right for government to walk away from its commitment to science, much less be taken in by its detractors.

If the impact on science of the Administration's budget strategy is to be lightened, time becomes a factor. It will be too late when the final decisions are locked into the Budget Message. By then, the lines will have been drawn between the Administration and the Congress. Now is the time to forestall a major mistake after which it could take a decade for a depleted research enterprise to recover and rebuild.

Cutting back federal expenditures by $28 billion, which is Mr. Ford's objective, may indeed make it possible to reduce taxes by the same amount. But with 75 percent of government's expenditures already "relatively uncontrollable," it will take a meat-ax to do it. Scientific research is an inviting target. Unless it is defended promptly and effectively, the United States as a learning society faces a stricken future.—WILLIAM D. CAREY, *Executive Officer, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036*

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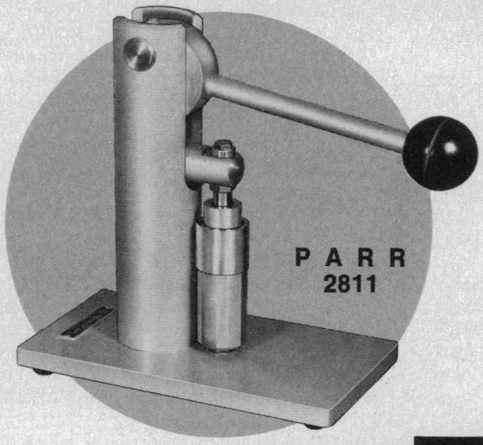

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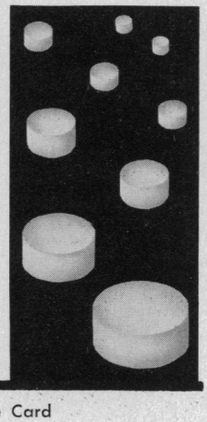

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