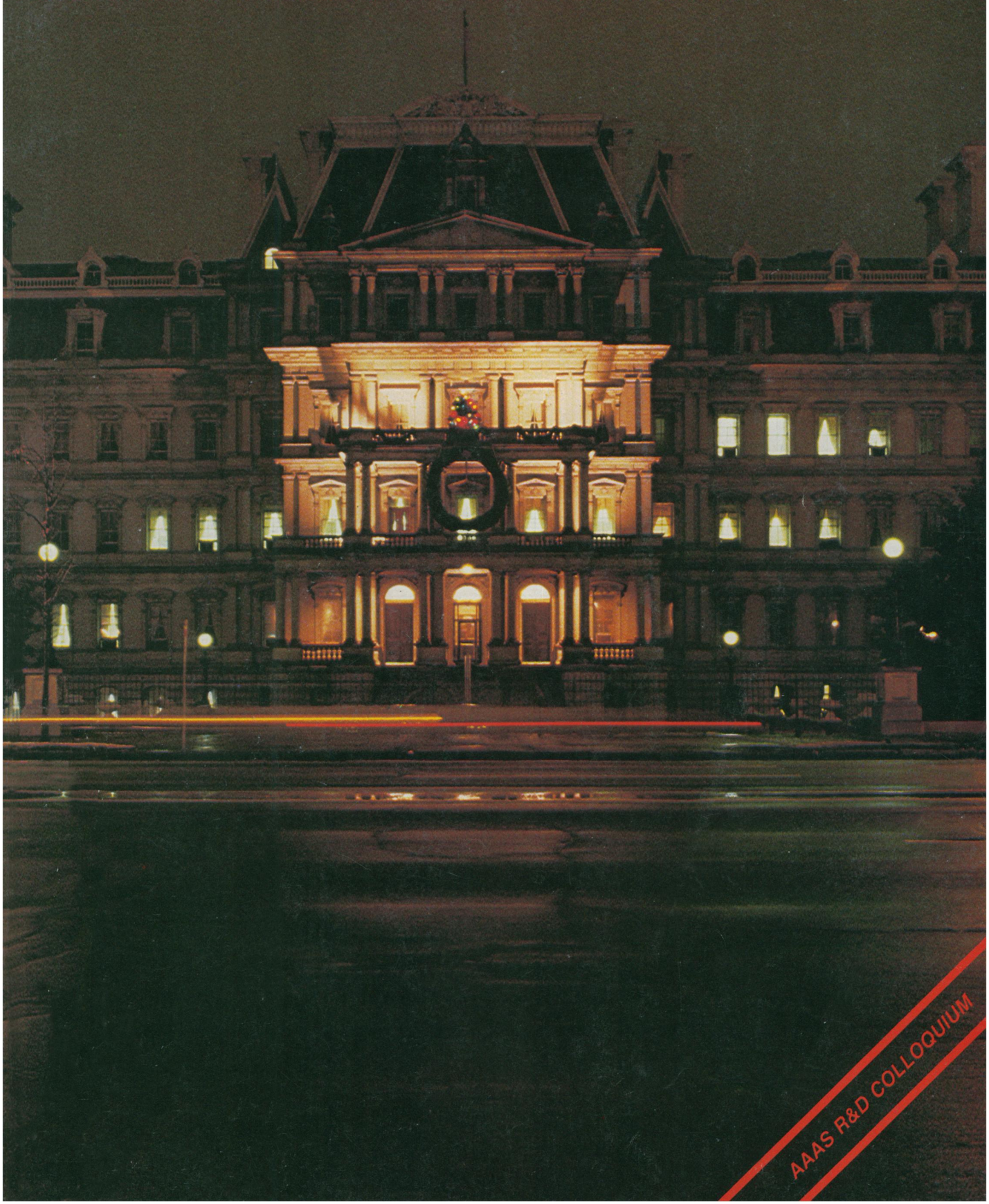
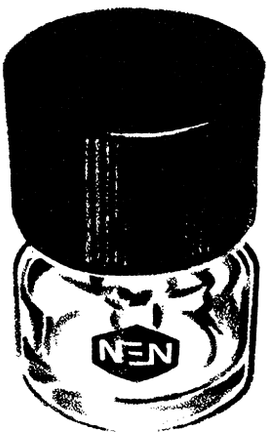
18 FEBRUARY 1983 · VOL. 219 · NO. 4586 $2.50

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



AAAS R&D COLLOQUIUM



What will you think of next?

Our future depends on your answer, because the labeled compound you'll be needing tomorrow is what we should be working on today. Otherwise we'd be followers, not leaders.

How do we get the answer? By being involved in biological research ourselves. By hearing papers and giving papers. By asking and being asked.

But it is not enough that we be simply innovators. If you have pinned your reputation on an original avenue of investigation, and one of our new labeled compounds is included in your protocol, we both have a lot at stake. Knowing this, we do the worrying, and double and triple test that chemical well before it gets to you.

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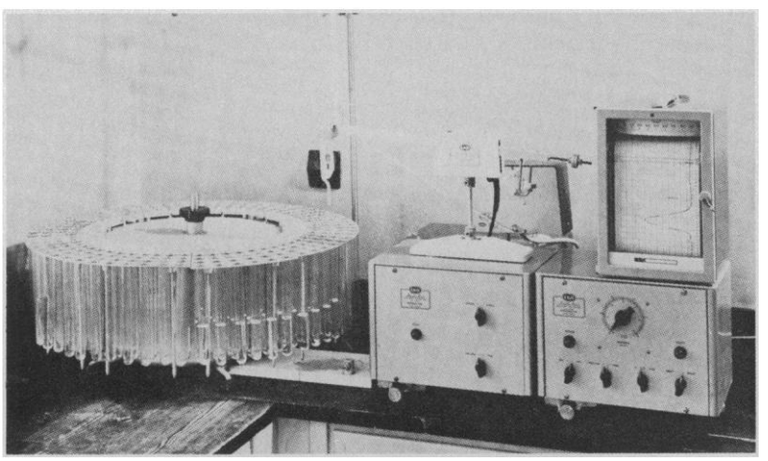
After 25 years, we've changed a lot, but LKB fraction collectors still perform dependably.

Dependability Report . . .
100,000 fraction changes and still working perfectly

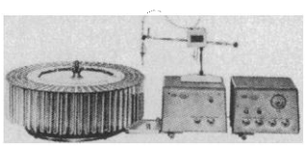


THE *RadiRac* BY LKB

Pictured above is one of the first RadiRac automatic fraction collectors built by LKB. It was delivered in 1957 to Professor Gunnar Sjöström at the Institute for Agriculture, Dairy Products and Horticulture, Alnarp, Sweden. Since then it has been operating almost without interruption night and day for more than 1,000 days, performing more than 100,000 fraction changes without any trouble whatsoever.

Unusual? Not to users of LKB RadiRacs in laboratories throughout the world. They rely on the meticulous engineering of LKB instruments for dependable performance year after year. The flexible RadiRac has all that is needed in a complete system for fraction collecting: assemblies for timed flow, volumetric siphoning or drop count fractionation, sectional tube racks for LKB patented square-wave filling, distributor funnel for preparative work. Compatible LKB equipment includes: MiniFlow Micropump, Uvicord UV Absorptiometer and Conductolyzer for gradient recording.

The RadiRac performs dependably in all atmospheres, even in coldrooms. Complete details are available in Literature File 3400S6. Prices from $532.00.



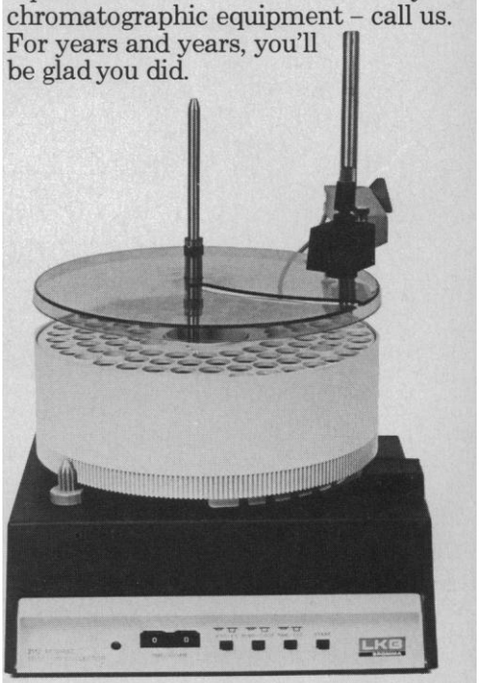
LKB **LKB-Produkter AB,** P.O.B. 12220, Stockholm 12, Sweden
LKB Instruments Inc., 4840 Rugby Ave., Washington 14, D. C.

An early advertisement for the original RadiRac fraction collector.

Today, the LKB RediRac, our smallest fraction collector, weighs a mere 3 kg (less than 10% of the original LKB RadiRac shown on the left). It also occupies ten percent of RadiRac's bench space while handling up to 160 fractions. RediRac is smarter, more versatile, yet costs half the price (when adjusted for inflation).

But one thing hasn't changed. The need for dependable performance is as great today as it was 25 years ago. And LKB still delivers reliable fraction collectors. Our reputation is built on it.

So when you need to add or replace a fraction collector – or any chromatographic equipment – call us. For years and years, you'll be glad you did.



The portable RediRac fraction collector.

LKB
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COVER

"Burning the midnight oil" at the Old Executive Office Building, Washington, D.C., late December 1982. Officials of the Office of Management and Budget work nights and weekends preparing the President's fiscal budget for presentation to Congress in January. R & D in the budget will be discussed at the Eighth Annual AAAS Colloquium on R & D Policy, 24–25 March 1983, Washington, D.C. See page 834. [Al Teich, Office of Public Sector Programs, AAAS]

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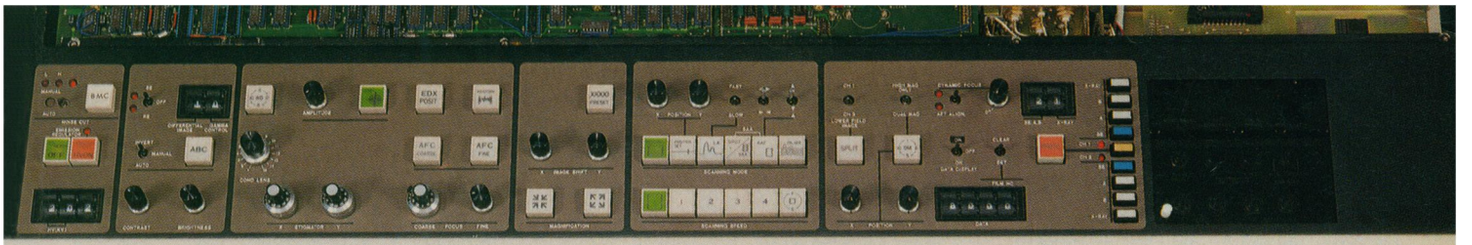

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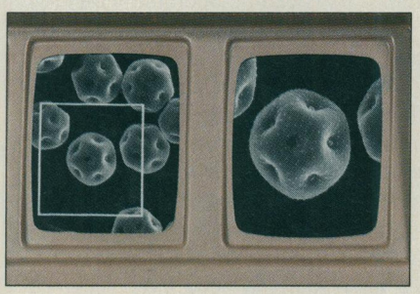
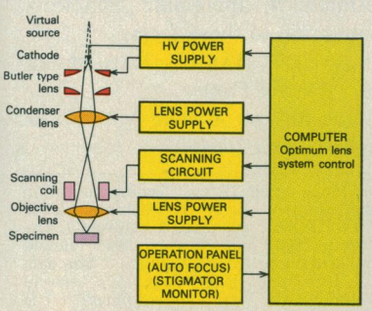
By employing a field emission source, consisting of a single crystal tungsten tip cathode and two anodes, source brightness, size, emission current, energy



spread and service life are greatly improved compared to conventional LaB_6 or tungsten filament sources. This source operates with an accelerating voltage of up to 30 kV and allows a guaranteed resolving power of 20Å. Magnification of 20~300,000X.



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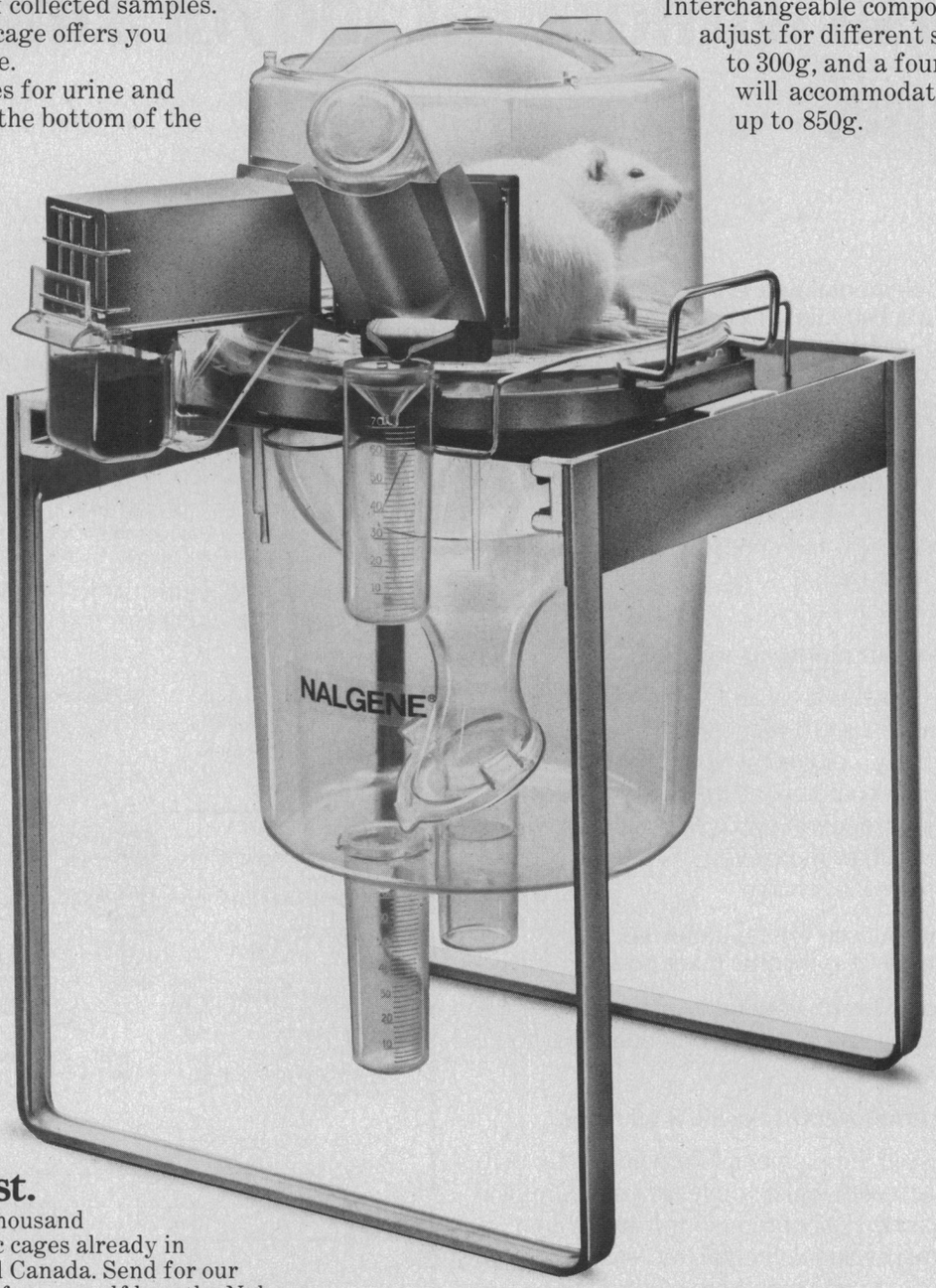

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18 February 1983, Volume 219, Number 4586 **SCIENCE**

Federal R & D: Not an Entitlement

The Administration's proposed R & D programs for fiscal year 1984 address two overwhelming national priorities: mobilization of scientific research and industrial high technology to spearhead economic progress, and restoration of national defense strength. Those priorities show up in three ways.

- Defense R & D, consistently neglected for nearly 20 years, is now being addressed. This includes more than $850 million for basic research.
- Basic research in the physical sciences and engineering, underfunded since the mid-1960's, will receive large, selective increases.
- Much of the increased basic research will be directed to universities, where it will also help train new scientists and engineers.

Over the years, in unpredictable, leisurely ways, basic research has led to new technology, which in turn has been the dominant source of growth and of new jobs. But now, in light of what has been happening to the competitiveness of U.S. industries, it is obvious that we cannot simply wait for good things to happen. Science in the universities and the federal laboratories can and must be better attuned to the opportunities of the industrial world. Our leadership in the international marketplace is at stake.

As a result, our fiscal 1984 program emphasizes selectivity. Increases are targeted to areas likely to have the greatest long-term impacts on new technologies—fields such as mathematics, physics, engineering, plant biology, materials science, astronomy, and space sciences—and specifically to universities, where research involves training of people needed in our increasingly technology-dependent economy. In fact, we consider the opportunities so great, and their potential impact so important, that basic research in those fields receives some of the greatest emphasis of any part of the federal budget. For example, overall basic research would grow by 10 percent, and agencies that support primarily physical sciences and engineering would grow by 15 percent. Moreover, in the National Science Foundation some disciplines, such as mathematics and electrical engineering, would grow by about 25 percent. And in the life sciences, with overall level funding, there are large support "spikes" in important subareas such as plant and molecular biology and the neurosciences. Civilian basic research is undergoing some of the most profound changes in decades. The essential point is that these selective increases neither "reward" nor "punish" fields of science. While segments of the research community may view our actions from personal perspectives, I hope they will realize that the increases are the Administration's way of addressing a very real national objective: our economic future.

Just as we have not allocated these funds for the usual reasons, we do not expect them to be used in the usual ways. Naturally, the various disciplines would welcome infusions of money to support more projects, say the next 10 or 15 percent of the proposals—all good—that missed the funding cutoff. But the President has not allocated these growth funds to support "next best" research. The real return on this federal investment will come from focusing on the best projects and permitting those nuclei to grow to world-leading concentrations of research excellence. This approach will yield two invaluable products: front-line scientific advances, and a growing body of superbly trained new scientists and engineers.

In spite of its utility, this kind of highly selective approach may not be popular. But science is not on the list of public obligations—like social security or Medicare or veterans' pensions—that have to be funded according to an egalitarian formula. Discretionary spending, which includes all of R & D, makes up only 22 percent of the federal budget today. Every budget item is under intense pressure, and arguments for increases have to be immensely convincing. The fact that so many arguments for research were so persuasive testifies to the central role of research in national policy.—G. A. KEYWORTH, II, *Science Advisor to the President, Office of Science and Technology Policy, Washington, D.C. 20500*

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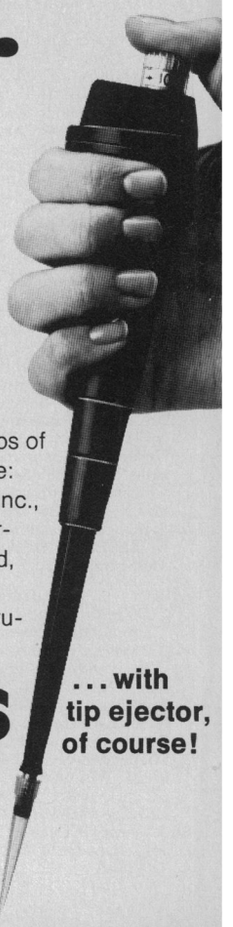
Unlike pipettes with micrometer adjustments and hairline volume settings, Eppendorf Digital Pipettes assure consistently accurate and reproducible volumes time after time. Practically the same size as our single-volume models, these new pipettes retain all the operating conveniences for which Eppendorf is famous. A finger rest at the top provides positive support during use and keeps the pipette from rolling on flat surfaces. All operations, including tip ejection, are controlled by a single button and without changing grip position.

Eppendorf Digital Pipettes with built-in tip ejector are available in three models: 2-10μl (contin. adjustable in steps of 0.1μl); 10-100μl (contin. adjustable in steps of 0.1μl); and 100-1,000μl (contin. adjustable in steps of 1.0μl). For literature, write: Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Road, Westbury, N.Y. 11590. In Canada: Brinkmann Instruments (Canada), Ltd.



Eppendorf Digital Pipettes

... with tip ejector, of course!

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24-25 MARCH 1983

AAAS Committee on Science, Engineering and Public Policy

announces the

Eighth Annual AAAS Colloquium on R & D Policy

Shoreham Hotel • Washington, D.C.

R & D, High Technology, and Economic Recovery

Trends and Topics

- R & D in the FY 1984 budget
- Congressional reactions
- Industry R & D funding
- International competition
- Human resources
- Research partnership

Current Data

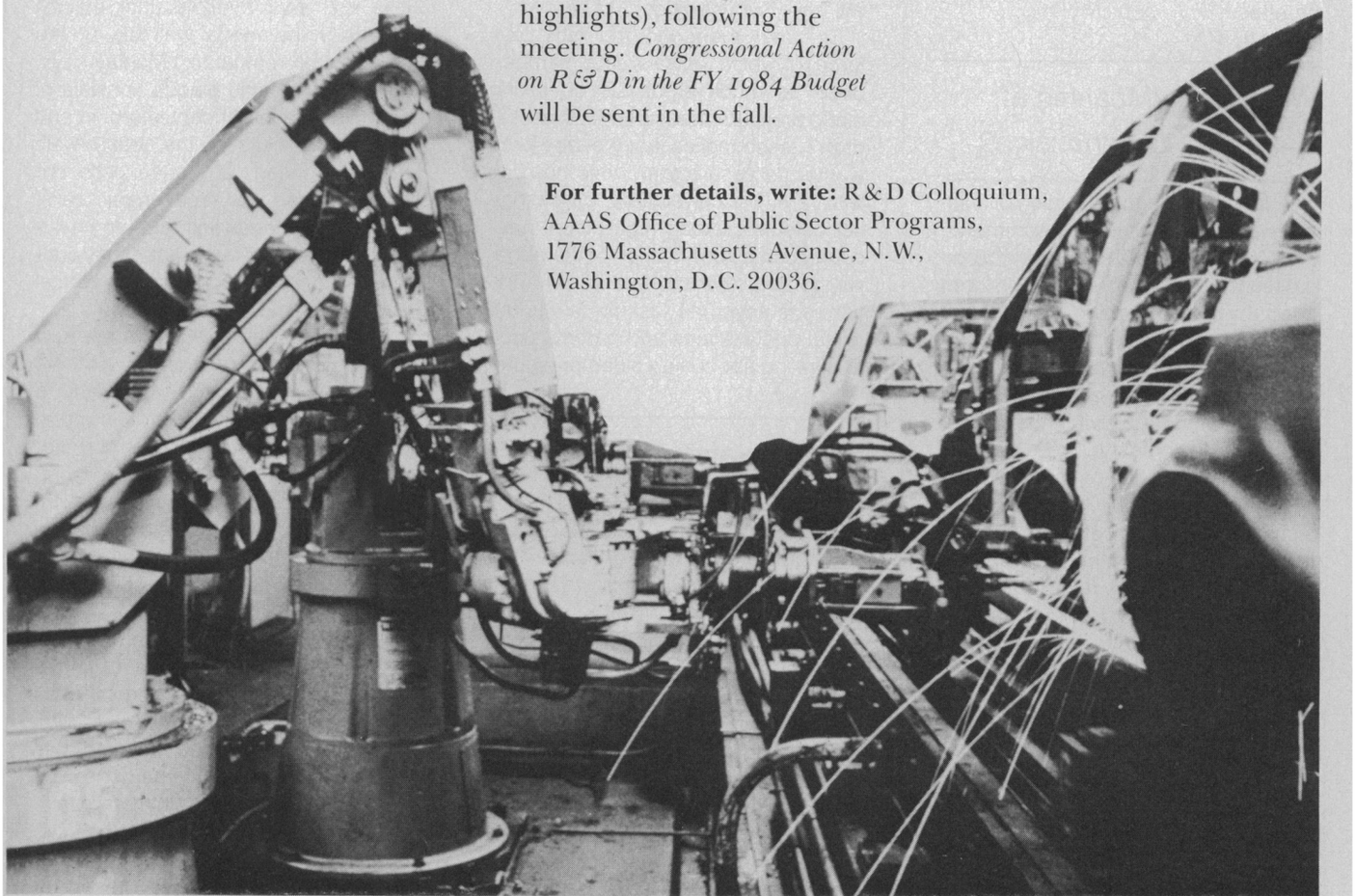
Registrants will receive *R & D in the FY 1984 Budget: A Preliminary Analysis* in advance of the Colloquium and *AAAS Report VIII: Research and Development, FY 1984*, by Willis H. Shapley, Albert H. Teich, and Jill P. Weinberg (including Colloquium highlights), following the meeting. *Congressional Action on R & D in the FY 1984 Budget* will be sent in the fall.

Informed Debate

Leaders from:

- The White House
- Federal R & D agencies
- Congress
- Industry
- Universities

For further details, write: R & D Colloquium, AAAS Office of Public Sector Programs, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.



Ford Motor Company

For advance registration, please use the form on the facing page.

8th AAAS R & D Colloquium
Washington, D.C.
24 & 25 March 1983

Advance Registration Form

Thursday & Friday, 24 & 25 March, at The Shoreham Hotel, 2500 Calvert St., N.W., Washington, D.C.

Registrant's Name _____ (last name) (first name and initial)

Affiliation _____

Mailing Address _____ (street and number)

_____ (city) (state and zip) (telephone number)

☐ Please check here if you need special services due to handicap. We will contact you prior to the meeting.

Enclosed is a check, purchase order, or credit card information (see below) for:

☐ $110 Full Registration (sessions, two meals, three publications)
☐ $ 80 Partial Registration (sessions, three publications)
☐ $ 40 Student Registration (sessions, three publications; fulltime graduate and undergraduate students only)

Separate Lunch Tickets at $17 each (no refund for meals after 21 March)
☐ Lunch on Thursday, 24th ☐ Lunch on Friday, 25th

Program, badge, meal tickets, and R&D in the FY 84 Budget: A Preliminary Analysis will be mailed 11 March. Registrations received after 11 March will be held at the AAAS Registration Desk at The Shoreham Hotel. AAAS Report VIII: Research & Development FY 1984 will be mailed in June and Congressional Action on R&D in FY 84 Budget will be mailed in the fall. (Highlights of the Colloquium will appear in Report VIII. Inquire for earlier reports and proceedings.)

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(Reservations received after 23 February cannot be guaranteed)

Names and Addresses of All Occupants of Room:

Name _____ Name _____

Address _____ Address _____

City _____ State _____ Zip _____ City _____ State _____ Zip _____

Room: ___Single ($74*) ___Double ($90*) ___Twin ($90*)

(*Plus 10% D.C. sales tax and $1 occupancy tax.)

Arrival: Date _____ Time _____

Departure: Date _____ Time _____

Be sure to list definite arrival and departure date and time. Hotel reservations will be held only until 6 p.m. unless otherwise specified. Check out time is 1:00 p.m.

Please indicate any special housing needs due to handicap _____

Enclose separate check, made out to The Shoreham Hotel, for first night's room deposit **or** indicate major credit card number:

Credit Card Name _____ Number _____ Expires _____

Cardholder's signature _____

Preliminary Program

Eighth Annual AAAS Colloquium on R & D Policy

24–25 March 1983 ● The Shoreham Hotel ● Washington, D.C.

Thursday, 24 March

8:00 a.m. **Registration**

9:00 a.m. **Welcome**
E. Margaret Burbidge, *President, AAAS; and Director, Center for Astrophysics and Space Sciences, University of California, San Diego*

Overview of R & D in the FY 1984 Budget
Willis H. Shapley, *Consultant to AAAS for the R & D Budget Project*
Albert H. Teich, *Manager, Science Policy Studies, AAAS*

9:30 a.m. **R & D FY 1984: The Budgetary Context**

Moderator:
J. Thomas Ratchford, *Associate Executive Officer, AAAS*

Speakers:
Frederick N. Khedouri, *Associate Director for Natural Resources, Energy and Science, Office of Management and Budget*
Van Doorn Ooms, *Chief Economist, Committee on the Budget, U.S. House of Representatives*
Third speaker to be announced

12:30 p.m. **Luncheon**

Presiding:
Ray Thornton, *Chairman, AAAS Committee on Science, Engineering and Public Policy; and President, Arkansas State University*

Address:
Ed Zschau, *Member, U.S. House of Representatives (R–Calif.)*

2:15 p.m. **R & D and Economic Recovery in a World Context**

Speakers:
George A. Keyworth II, *Director, Office of Science and Technology Policy, Executive Office of the President*
Milton D. Stewart, *President, Small Business High Technology Institute*
Third speaker to be announced

4:30 p.m. **Agency Perspectives on R & D in the FY 1984 Budget**

Department of Defense

Moderator:
Richard A. Scribner, *Staff Representative, AAAS Committee on Science, Arms Control and National Security*

Speaker:
Paris Genalis, *Assistant Director, Research and Laboratory Management, Office of the Secretary of Defense*

Discussant:
Willis D. Smith, *Professional Staff Member, Committee on Armed Services, U.S. Senate*

Department of Energy

Moderator:
Allan R. Hoffman, *Executive Director, Committee on Science, Engineering and Public Policy, National Academy of Sciences*

Speaker:
Joel A. Snow, *Director, Science and Technology Affairs Staff, Office of Energy Research, Department of Energy*

Discussant:
Martha A. Krebs, *Staff Director, Subcommittee on Energy Development and Applications, U.S. House of Representatives*

National Aeronautics and Space Administration

Moderator:
Willis H. Shapley, *Consultant to AAAS for the R & D Budget Project*

Speaker:
Robert F. Allnutt, *Acting Associate Administrator for External Relations, National Aeronautics and Space Administration*

Discussant:
Dennis W. Barnes, *Chief Scientist, Committee on Commerce, Science and Transportation, U.S. Senate*

National Institutes of Health

Moderator:
Jerold Roschwalb, *Director of Government Relations, National Association of State Universities and Land Grant Colleges*

Speaker:
Michael I. Goldberg, *Associate Director for Program Planning and Evaluation, National Institutes of Health*

Discussant:
David N. Sundwall, *Professional Staff Member, Committee on Labor and Human Resources, U.S. Senate*

National Science Foundation

Moderator:
John C. Crowley, *Director of Federal Relations for Science Research, Association of American Universities*

Speaker:
M. Kent Wilson, *Director, Office of Planning and Resources Management, National Science Foundation*

Discussant:
Thomas R. Kramer, *Staff Director, Subcommittee on Science, Research and Technology, U.S. House of Representatives*

6:00 p.m. **Reception**

Friday, 25 March

9:00 a.m. **Science, High Technology and the Research Partnership**

Moderator:
Sheila E. Widnall, *Member, AAAS Board of Directors; and Professor of Aeronautics, Massachusetts Institute of Technology*

Speakers:
Donald S. Fredrickson, *Scholar-in-Residence, National Academy of Sciences*
Roland W. Schmitt, *Senior Vice President, Corporate Research and Development, General Electric Co.*
George Bugliarello, *Member, AAAS Committee on Science, Engineering and Public Policy; and President, Polytechnic Institute of New York*
D. Bruce Merrifield, *Assistant Secretary for Productivity, Technology and Innovation, Department of Commerce*

12:15 p.m. **Reception**

12:45 p.m. **Luncheon**

Speaker:
John Slaughter, *Chancellor, University of Maryland; and former Director, National Science Foundation*

Concluding Remarks:
William D. Carey, *Executive Officer, AAAS*

2:30 p.m. **Adjournment**