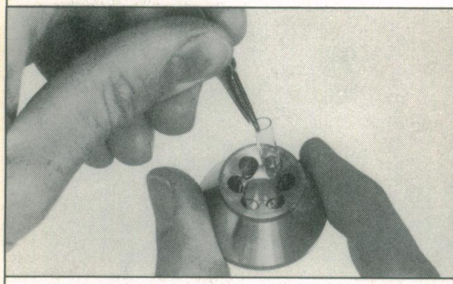
8 February 1980 • Vol. 207 • No. 4431 $1.50

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

New rotors for the Airfuge®–

the small-sample ultracentrifuge.



The new 30° fixed angle rotor holds up to 240 μl per tube and provides forces up to 178,000 g.

The new Batch Rotor rapidly pellets 2 to 7 ml of material.

The new Electron Microscopy Particle Counting Rotor is useful for virus research.

The Airfuge® air-driven ultracentrifuge, with its high forces and speeds, is unsurpassed for centrifuging small samples rapidly. The Airfuge continues to grow in versatility. Now there are five rotors to choose from for numerous applications.

Two fixed angle rotors, the 18° and the new 30° rotor, can pellet any material that can be sedimented in a full-sized ultracentrifuge, but in a fraction of the time. The rotors accelerate to a maximum speed of 95,000 rpm in just 30 seconds. They can be used for separations ranging from molecular weight determination studies, binding studies, cellular separations, lipoprotein fractionation, to steroid hormone receptor assays.

The Batch Rotor pellets material in a polyethylene liner or in the rotor body itself. The Electron Microscopy Particle Counting Rotor sediments particles uniformly onto the surfaces of specimen grids for rapid, accurate, and reliable detection and counting. The unique Chylomicron Rotor clarifies lipemic sera by flotation of chylomicrons in just ten minutes.

The Airfuge ultracentrifuge uses ordinary laboratory air pressure to spin rotors almost friction-free on a cushion of air. It's efficient, quiet, and simple to operate. Ask about the 30-day free trial offer for the Airfuge. For a description of the Airfuge and its applications, write for the new Airfuge brochure, SB-557, to Beckman Instruments, Inc., 1117 California Ave., Palo Alto, CA 94304.

BECKMAN

Circle No. 176 on Readers' Service Card

ISSN 0036-8075

8 February 1980

Volume 207, No. 4431

SCIENCE

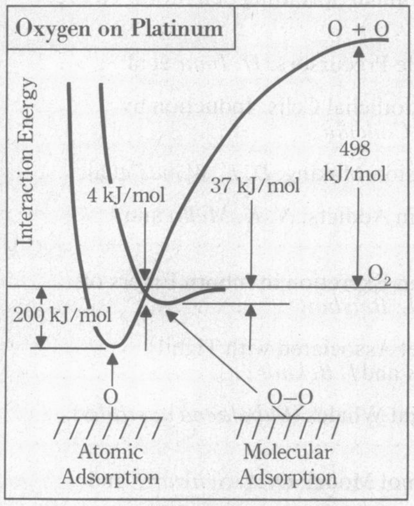
SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with **The Scientific Monthly®**. Domestic individual membership and subscription (51 issues): $34. Domestic institutional subscription (51 issues): $70. Foreign postage extra: Canada $12, other (surface mail) $15, air-surface via Amsterdam $40. First class, airmail, school-year, and student rates on request. Single copies $1.50 ($2 by mail); back issues $2.50 ($3 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*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

COVER

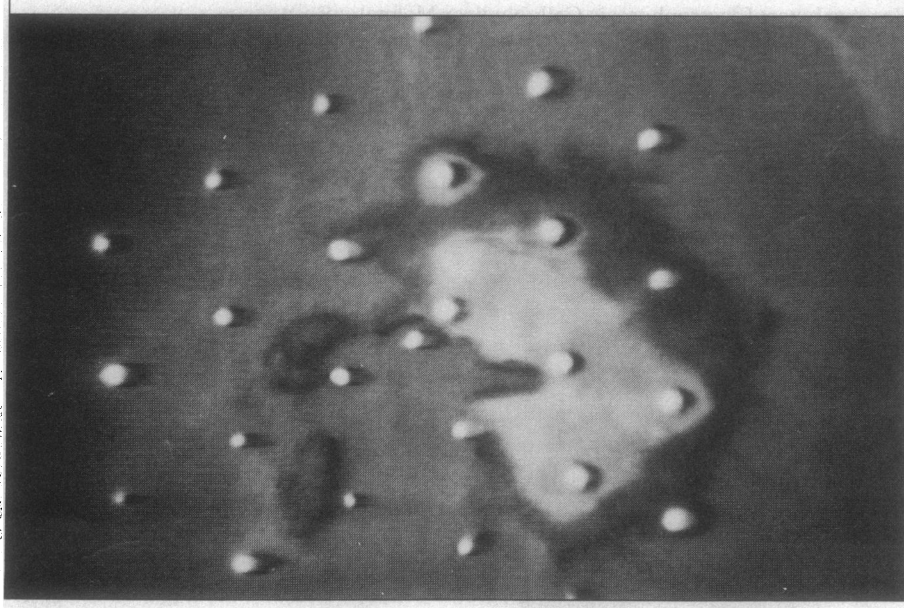
Underwater photograph of sun illustrates color of the oceanic "blue waters" caused by selective transmission and scattering of the shorter wavelengths of sunlight. Absorption of these energetic quanta can produce detectable concentrations of free radicals. See page 637. [Anita M. Brosius, Woods Hole, Mass.]

The Atomic Arrangement

In a recent experiment, scientists at the General Motors Research Laboratories studied changes in chemical bonding during the dissociation of oxygen molecules on platinum. Preliminary surface work has explored an interesting new phenomenon: the mechanism of oxygen dissociation over a wide range of temperatures.



A simplified schematic illustrating the reaction potential energy surface for oxygen-adsorption on a close-packed platinum surface.



An electron diffraction pattern which shows diffraction patterns from an oxygen-covered hexagonally close-packed platinum surface at 0° C.

UNDER what conditions will oxygen molecules dissociate into single atoms on a platinum surface? What is the mechanism for oxygen dissociation? Those are the kinds of questions that Dr. John Gland and his colleagues at the General Motors Research Laboratories are investigating to get a better understanding of the chemistry behind catalysis.

Their work has valuable practical implications for the automotive field, where catalysis is used to remove harmful emissions from automobile exhaust. Most cars built in the U.S. use catalytic converters filled with beads containing platinum to chemically transform carbon monoxide and unburned hydrocarbons into harmless CO_2 and water.

While it has long been known that catalysts are an effective way to convert these gases, little is known about precisely why and in what order the basic atomic reactions occur.

In seeking answers to these questions, surface chemists study the elemental composition and geometric arrangement of atoms in the first few atomic layers of the surface and the means by which atoms and molecules from the gas phase bond to the surface.

In his most recent work, Dr. Gland has been studying the adsorption and desorption of oxygen on platinum single-crystal surfaces. This is important because oxygen is the agent that must be adsorbed on the surface to react with carbon monoxide and hydrocarbons to convert them to CO_2.

The experiments were conducted in a stainless steel ultrahigh vacuum system equipped with an electron energy analyzer and a mass spectrometer. The electron energy analyzer allows one to measure the concentration and character of the oxygen adsorbed on the platinum surface. The mass spectrometer is used to measure the desorption of O_2 as the platinum surface is heated. Mathematical analysis of the desorption process allows one to characterize the chemical bond between the oxygen and the platinum surface.

In these experiments, the platinum surface is covered with oxygen at the extremely low temperature of −179°C (almost the temperature of liquid nitrogen) by exposing it to gaseous O_2 molecules. The oxygen remaining in the gas phase is pumped away, and then the desorption of oxygen from the surface is observed as the platinum crystal is gradually heated to 1000°C.

The oxygen was found to desorb from the surface in two distinctly different temperature regimes—part at −125°C and the rest at about 425°C. By using the oxygen-18 isotope, it was established that the low temperature desorption represents oxygen that was adsorbed on the surface in a molecular form while the higher temperature desorption corresponds to oxygen adsorbed in the atomic form. From an analysis of the desorption process, it was possible to establish the complete energetics. Oxygen molecules from the gas phase strike the surface and are weakly bound (37 kJ/mol). The adsorbed oxygen molecule can either desorb into the gas phase (37 kJ/mol) or dissociate into atoms (33 kJ/mol). The atoms are bonded very strongly (200 kJ/mol) to the surface.

FROM the desorption analysis, it was also possible to deduce the mechanism for the dissociation process. The interesting conclusion that results is that the formation of O atoms on platinum is a two-step process—oxygen is adsorbed in a molecular state and then dissociates to form atoms.

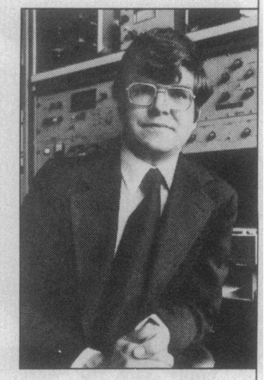
The GM scientists were most interested in learning how this adsorbed molecular species is bonded to the platinum surface. Fortunately, another technique was available to determine the bonding. The technique is called electron energy-loss spectroscopy and is quite new—there are only six or seven such instruments in the world. The measurements not only confirmed the existence of the adsorbed molecular oxygen but showed that it was bound by the transfer of two electrons from the platinum surface into the antibonding π_g orbitals of oxygen. "This was most exciting" said Dr. Gland, "because this is the first time that this type of oxygen bond has been observed on a metal surface.

"We're getting closer and closer to a more specific understanding of catalysis," says Dr. Gland. "The more we learn about simple chemical systems, the better we'll be able to control more complicated systems. That has excellent implications for protecting the environment."

THE MAN BEHIND THE WORK

Dr. John Gland, 32 years old, is a Senior Research Scientist in surface chemistry at the General Motors Research Laboratories. He heads a group of 7 investigators, 4 with Ph.D.s, all involved in work relating to the basic surface chemistry of catalysis.

A graduate of Wittenberg University in Ohio, Dr. Gland received his Ph.D. in physical chemistry at the University of California, Berkeley, in 1973 and joined the General Motors staff that year.



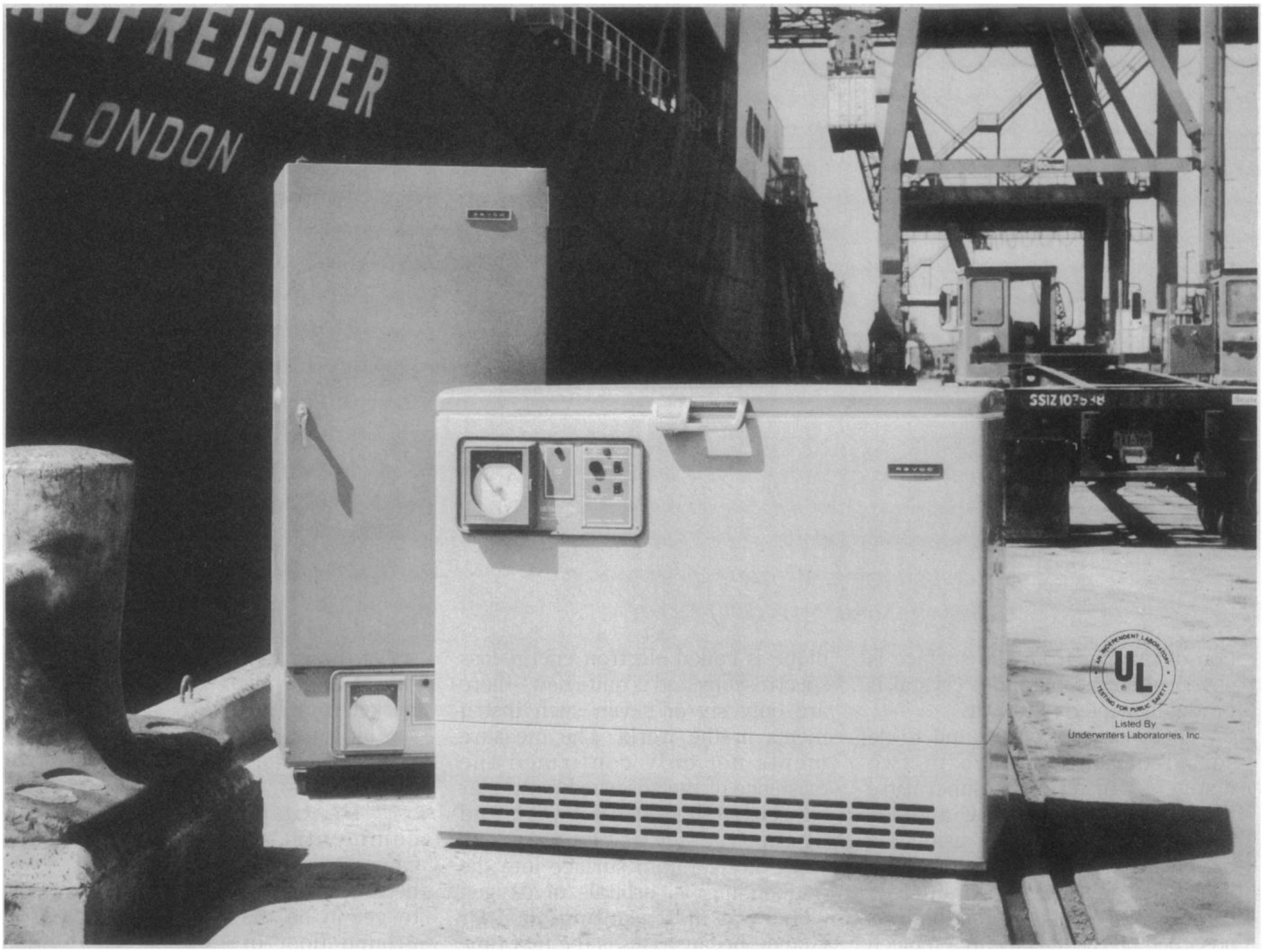
Dr. Gland comments: "I came to GM Labs because I wanted to get in on the ground floor of an exciting new field. The atmosphere here is very open, with lots of cross-pollination among departments. With several hundred people with Ph.D.s here, we've got a lot of human resources to draw on in all the basic sciences.

"Typically, management defines a broad problem, then we're free to tackle the solution in any way we choose. They give us the freedom, equipment and support to get the job done correctly."

In addition to his research, Dr. Gland enjoys backpacking in Wyoming and in the Sierra Nevada Mountains in California.

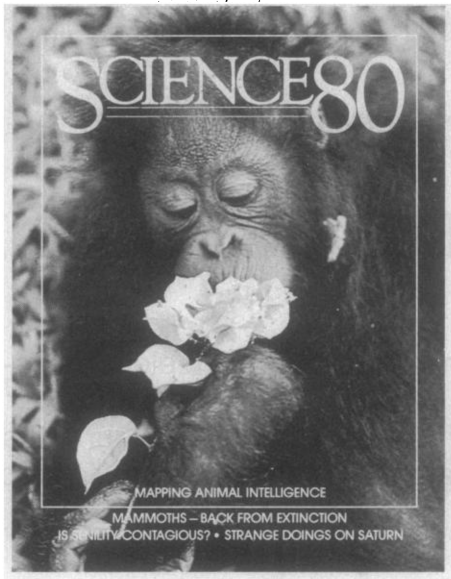
GM General Motors

People building transportation to serve people


FREIGHTER
LONDON
Listed By Underwriters Laboratories, Inc.

With a Brinkmann Homogenizer, you can homogenize samples under 1 ml
...homogenize anaerobically
...and without cross contamination.
When it comes to breaking down and homogenizing virtually any type of tissue, small organs, bones, muscle, cartilage, or even an entire mouse, the Brinkmann Homogenizer is in a class by itself.
Consider its power. A 600W motor develops up to 30,000 rpm (1200W on PT-45 model, with up to 20,000 rpm) to assure complete homogenization of most samples within 30 to 60 seconds (other instruments may require 15 minutes or more).
Consider the wide choice of generators, all made entirely of stainless steel. It includes a Microprobe Generator small enough to fit into a standard cuvette (for samples as small as 1 ml or less), Anaerobic Generators for aerosol-free homogenization, a Mechanical Seal Generator to minimize contamination and cleaning problems, even an in-line bench-top unit that homogenizes without admitting air.
Consider its unique method of tissue destruction, a combination of ultrasonic energy and mechanical shearing action, based on the Willems High Frequency Principle.
Consider the optional electronic speed control unit, with its sensor that continually monitors the actual speed and keeps it constant, regardless of load.
From any standpoint, nothing compares with a Brinkmann Homogenizer. For literature, write Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Road, Westbury, N.Y. 11590 or call toll-free 800/645-3050. In Canada: Brinkmann Instruments (Canada), Ltd.
Brinkmann Homogenizers
From tissue to homogenate in 30 seconds!
SYBRON | Brinkmann
Circle No. 147 on Readers' Service Card

A BEAUTIFUL NEW MAGAZINE



OF SCIENCE FROM THE AAAS

When profound and beautiful discoveries in mathematics, in human genetics, in radio astronomy go largely unnoticed . . . When new insights into the nature of life, the origin of planets, the chemical basis of behavior are known only to a few . . . When critical public and private choices in energy, health, national security depend on accurate assessments of technical subjects . . .
. . . Then it's time that the public had more than "media events" to inform them about science and technology.

To help fill this need, the American Association for the Advancement of Science is publishing a new magazine, Science 80, intended for an educated public readership. The new magazine will range over the scientific disciplines, medicine, and technology—and their impact on people.

A Magazine for You and Your Family

As a reader of *Science* and as a member of the AAAS, you are already well-informed about the progress and the politics of science. *SCIENCE 80* will not duplicate or replace *Science*, but rather supplement it. We believe that you and your family will find much to enjoy in the new magazine.

Science 80 is edited to entertain as it informs, written by talented science journalists and authors who write with authority but at a level understandable to those with no technical training.

Science 80 will help you keep abreast of what's being done in medicine and health fields. It will help you keep up with new technologies and tools, new discoveries in chemistry, physics, biology and anthropology.

Splendid Color Illustrations

You will delight in a wealth of vivid science illustrations. Full color photographic portfolios. Micrographs, aerial photography, wildlife portraits. Science 80 is a magazine you will want to save.

An Authoritative Magazine

Science 80 is grounded in the same commitment to excellence and accuracy that you find in the pages of *Science* every week. William D. Carey, Executive Officer of AAAS and also publisher of *Science*, will serve as publisher. Dr. Allen L. Hammond, former Research News Editor of *Science*, will be the editor.

As an AAAS publication, Science 80 will have available to it the resources of the world's largest general scientific organization.

Available by Subscription Only

Science 80 is not sold on newsstands. It is available only by subscription. The regular price is $12 a year. But when you become a Charter Subscriber, your price is only $9.

Science 80 will provide a new and much needed source of information for the public. It will be worthy company in your home for your AAAS membership journal, *Science*. Come learn and enjoy with Science 80 by reserving your Charter Subscription now!

CHARTER RESERVATION FORM

Please enter my Charter Subscription and bill me for $9. (6 issues in total.)

NAME ______________________________
Please print

ADDRESS______________________________

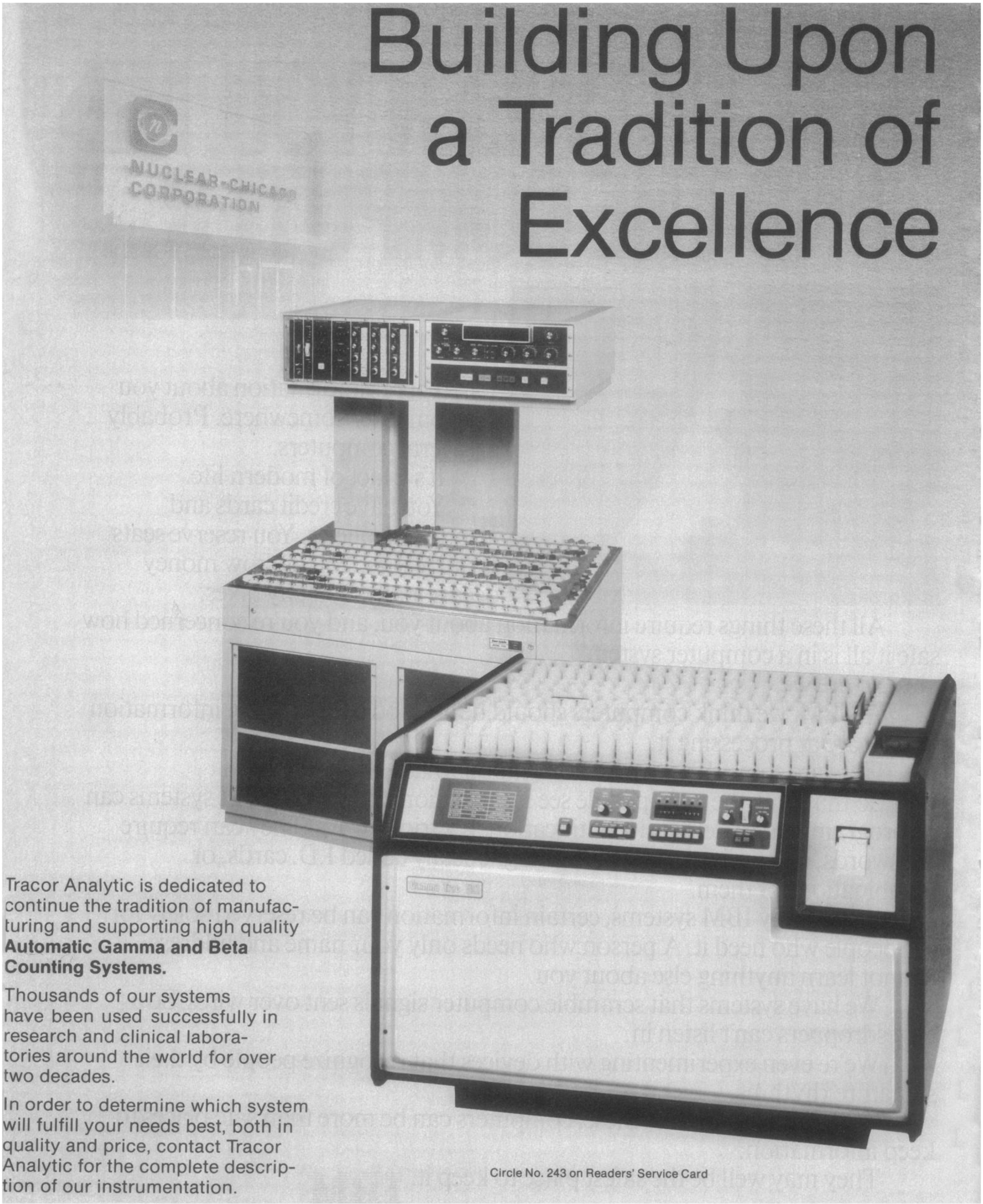
CITY________ STATE__________ ZIP__________

Send no money. Just mail to Science 80, Subscription Department, P.O. Box 10778, Des Moines, Iowa 50340. Allow 6-8 weeks for delivery of first bimonthly issue.

SCIENCE80

New bimonthly magazine from the American Association for the Advancement of Science

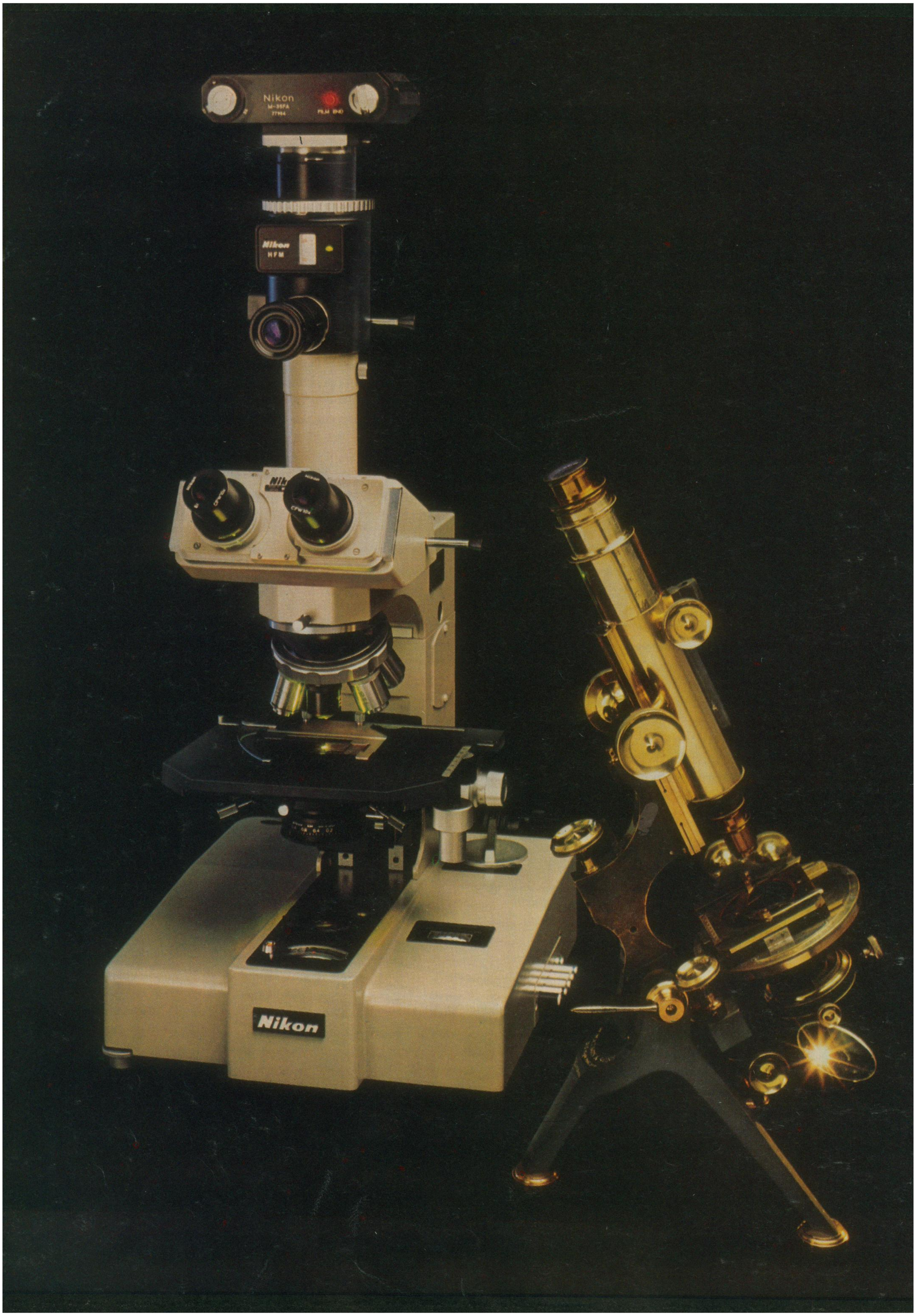
HBF36

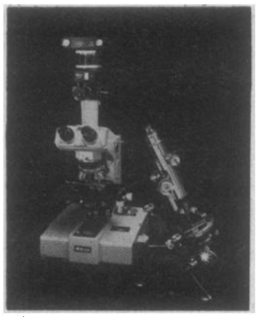


Tracor Analytic

TRACOR ANALYTIC INC.
1842 Brummel Drive, Elk Grove Village, Illinois 60007 (312) 364-9100

Circle No. 190 on Readers' Service Card


Nikon
M-35FA
FILM END
Nikon
HFM
Nikon



From the beginnings of biomedical research, instruments have played an important role in the drama of discovery. Crude though they were, early microscopes served to extend the vision of the determined researchers who, in turn, extended our understanding of life itself.

Today, researchers are still characterized by the rare insight and unusual skill of their predecessors. But their vision of the microscopic world is considerably sharper; thanks in part to Nikon's tireless dedication to the creation of superior optics.

Now, with a single stunning innovation, Nikon has produced an unprecedented advance in microscope technology. Called CF optics, it's a development so revolutionary that it represents far more than a refinement. It stands as nothing less than an entirely new standard of light microscope performance. A standard against which all others will be measured.

To achieve this dramatic breakthrough, Nikon engineers combined a new, extra-low dispersion glass with an ingenious concept in optical design to virtually eliminate chromatic aberration. The Nikon CF system delivers unparalleled resolution, color fidelity, flatness of field and image brightness. In fact, CF optics bring to Nikon resolving power closely approaching theoretical limits.

Biomedical research is a matter of life itself. It demands Nikon. The difference between seeing and not seeing. Knowing and not knowing.

For further information on the entire line of Nikon instruments for biomedical research, contact: Nikon Incorporated, Instrument Division, Ehrenreich Photo-Optical Industries Inc. 623 Stewart Avenue, Garden City, NY 11530 (516) 222-0200.

Look to *Nikon*
ニコンとご用命下さい
Blicken Sie auf Nikon

Circle No. 182 on Readers' Service Card

IN BIOMEDICAL RESEARCH, LOOK TO NIKON.

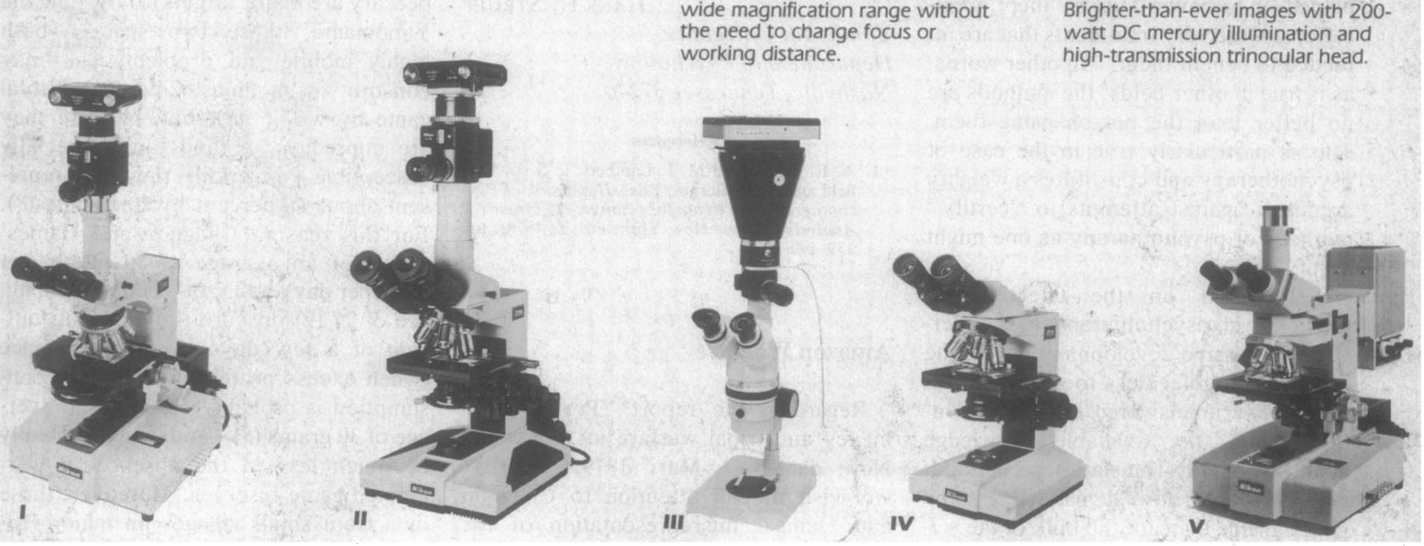
I **BIOPHOT RESEARCH PHOTOMICROSCOPE WITH NOMARSKI DIC** — Everything an advanced research microscope should be, plus CF optics for unsurpassed resolution and contrast. Complete capabilities for Nomarski differential interference contrast, phase contrast, and other techniques. Complete photomicrographic capability.

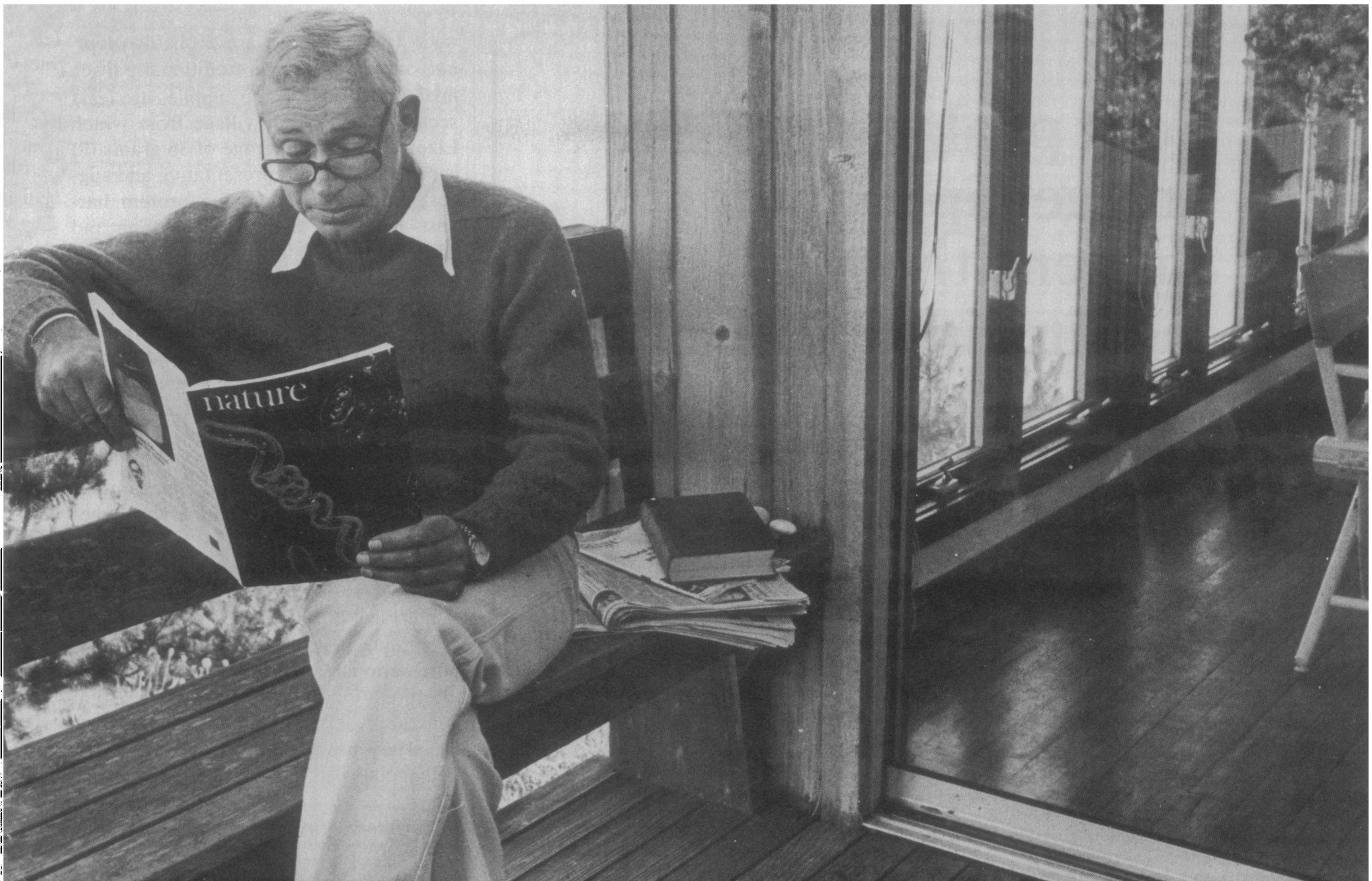
II **OPTIPHOT RESEARCH MICROSCOPE WITH HFM** — Versatile, rugged microscope features CF optics for superb field flatness, contrast and resolution. Shown here with trinocular bodytube and the advanced, computer controlled HFM camera system for consistently correct exposures — automatically.

III **SMZ-10 ZOOM STEREO MICROSCOPE** — High-resolution zoom stereo microscope with the ability to photograph actual stereo pairs by the simple touch of a lever. Features a continuous zoom over a wide magnification range without the need to change focus or working distance.

IV **LABOPHOT LABORATORY MICROSCOPE** — Developed with special attention to the sturdiness and simplicity of operation required in laboratory and clinical work. Employs CF optics for unsurpassed optical performance. The microscope accepts the full line of Nikon accessories, including photomicrography.

V **FLUOPHOT RESEARCH FLUORESCENCE MICROSCOPE** — Provides transmitted-light or reflected-light fluorescence with convenient one-step selector knob. Built-in turret with four reflected-light fluorescence excitation modes. Brighter-than-ever images with 200-watt DC mercury illumination and high-transmission trinocular head.





The world's leading scientists get it every week . . . and so should you.

If you're searching for a way to speed up your own research, if you're looking for advancement where you work, or if you're thinking of moving on to something more stimulating, how can you afford to get science news or research results late or second-hand?

We think you'll do better if you take out your own personal subscription to **Nature,** the science magazine that is read avidly—as soon as it is published—by the very scientists whose work is a challenge to your own continued progress.

With your own subscription to **Nature** you'll get the news and research reports you need, not as the fourth or ninth name on a routing slip, sometimes weeks after publication, but immediately, with all the advantages that immediacy implies.

Half-price offer

Until now, perhaps the only question about a personal subscription to **Nature** has revolved around the rather steep fee—$135 a year. For the moment, however, because we want to make **Nature** far more accessible to American scientists—who contribute 30% or more of each issue's contents—you may now get **Nature** at half-price—just $67.50 for 52 weekly issues.

Circle No. 1 on Readers' Service Card

Or you may start with a half-year trial, at $40; or a three-month trial, at $25.

Whichever your choice, simply fill in the coupon — and mail it today.

Get the benefits of your own **Nature** every week, just as the world's leading scientists have been doing for years. **Clip and mail today.**

TO: NATURE 15 East 26th Street, New York, N.Y. 10010

☐ Yes, I want to receive a personal subscription to **Nature** for a year, at the new, half-price rate of $67.50

I prefer to start on a trial basis:

☐ Six months of **Nature**, for $40. ☐ Three months of **Nature**, for $25.

☐ I enclose my **personal** check for the full amount indicated.

☐ I prefer that you bill me via my Credit Card account:

Account No.

☐ Visa ☐ Master Charge ☐ American Express Exp. Date

Name

Address

City State Zip

Subscription orders *must* be accompanied by personal check or credit card number.

noco tributaries (*9*), are probably *atypical*, since Yąnomamö traditionally dwell inland (*9*), where game supplies are least secure. The interior village from which Lizot reports an average of 36 grams (*9*) is probably more representative and suggests that the Yąnomamö protein harvest—when the distribution of tapir and white-lipped peccary are taken into account—may frequently become marginal, especially for large settlements and where population pressure—evidenced by high rates of female infanticide (*7*, *9*)—has critically reduced strategic game supplies. This puts severe strains on intravillage game distribution, leading to fission and ensuing hostilities (*5*, *7*). Nevertheless, as Chagnon and Hames note, the most intense and chronic war is between more distant villages. We attribute this in good measure to competition engendered by deep-forest hunting of certain critical but problematic species.

Nothing in Chagnon and Hames' report seriously discredits the ecological interpretation of Amazon warfare (*10*) in general or of Yąnomamö war in particular. They have yet to propose a compelling alternative.

ERIC B. ROSS

Department of Anthropology, University of Michigan, Ann Arbor 48104

JANE BENNETT ROSS

Department of Anthropology, Columbia University, New York 10027

References

1. D. Gross, *Am. Anthropol.* **77**, 526 (1975).
2. E. Ross, *Curr. Anthropol.* **19**, 1 (1978).
3. W. Denevan, in *The Native Population of America in 1492*, W. Denevan, Ed. (Univ. of Wisconsin Press, Madison, 1976), pp. 205–234; B. Meggers, *Amazonia: Man and Culture in a Counterfeit Paradise* (Aldine, Chicago, 1971); H. Klinge, W. A. Rodrígues, E. Brunig, E. J. Fittkau, in *Tropical Ecological Systems*, F. Golley and E. Medina, Eds. (Springer, New York, 1975), pp. 115–122.
4. T. Myers, *Am. Anthropol.* **78**, 354 (1976).
5. E. Ross, *Curr. Anthropol.* **20**, 151 (1979).
6. H. Hickerson, in *Man, Culture, and Animals*, A. Leeds and A. Vayda, Eds. (AAAS, Washington, D.C., 1965), pp. 43–65; L. D. Mech, *Science* **198**, 320 (1977).
7. N. Chagnon, *Yąnomamö: The Fierce People* (Holt, Rinehart & Winston, New York, 1968).
8. J. Lizot, *Curr. Anthropol.* **20**, 150 (1979).
9. ——, *Man* **12**, 497 (1977).
10. For a more detailed discussion of these issues, see (*5*); also J. Ross, in *Beyond the Myths of Culture: Essays in Cultural Materialism*, E. Ross, Ed. (Academic Press, New York, in press).

The response by Ross and Ross to our report on tribal warfare in Amazonia is punctuated with so many undocumented assertions and misrepresentations of the existing literature that it would take an article-length response to address them. Coincidentally, however, we have already submitted a two-part expanded version of our report to another scientific journal. Most of the topics mentioned by the Rosses are dealt with more extensively in the expanded version than was possible in our original *Science* report, and we believe we adequately answer the questions raised by the Rosses.

One overriding major issue, however, should be kept fully in mind in this debate. In the sciences there must be a meaningful relation between empirical evidence, analytical methods, and general theoretical propositions. Theories must be falsifiable, and a peculiar attribute of the "Protein School" is that the various members consistently modify their positions to remove their theory further and further away from the possibility that it could be falsified. Thus, in 1974, one of the senior spokesmen of the Protein School, Marvin Harris of Columbia University, summarized the general position accordingly: When asked, ". . . how do you explain warfare among the Yąnomamö?" he replied "I think there may be a shortage of protein there . . ." (*1*), a contention prompted by the then-valid claim that the first author of the *Science* report had not presented quantified data on protein consumption during the course of his previous field studies. Our *Science* report was an attempt to provide such data, and the field research conducted by the second author was specifically designed to answer that criticism. Astonishingly, after our report in *Science* was published and clearly showed that there is considerable reason to doubt that a protein shortage exists, Harris argued, ". . . it is not surprising that the small settlements studied by Chagnon and Hames enjoy high per capita fish- and game-protein levels" (*2*). This new position is found in the above criticism of our report by the Rosses, adumbrated also in a recent publication by E. Ross (*3*) that describes efforts to reconcile scientific disagreements by recourse to evidence as ". . . vacuous empiricism. . . ." How does one falsify the "scientific" claim that a *shortage* of animal protein in native Amazonian diets leads to tribal warfare when *high* per capita protein consumption also leads to the same effect? We would indeed, using the logic of the Protein theorists, find it difficult to provide a compelling alternative to this kind of preemptive theorizing!

As for an alternative approach to the relation of material resources to human biocultural evolution, we believe the second part of our forthcoming article will adequately address *this* issue. The general bodies of theory relevant to this issue have been laid out in Chagnon and Irons (*4*) (reviewed in *Science*, 14 December 1979, p. 1294) and in the general field of evolutionary ecology, summarized in such texts as Krebs and Davies (*5*) (reviewed in *Science*, 24 August 1979, p. 781). Ecology, finally, derives from the field of biology—whether or not it is modified with the adjective cultural—and the "cultural ecology" of the Protein School seriously violates many principles of ecological theory as these are widely understood by biologists.

We sincerely hope that the theory to be presented in the forthcoming essay by J. Ross (cited in reference 10 of the Rosses' critique) on Amazon warfare unambiguously presents propositions that can be verified or falsified by empirical data.

NAPOLEON A. CHAGNON
RAYMOND B. HAMES
Department of Anthropology, Pennsylvania State University, University Park 16802

References

1. M. Harris, *Cows, Pigs, Wars and Witches: The Riddles of Culture* (Random House, New York, 1974), p. VI.
2. ———, *Nat. Hist.* **88** (No. 7), 36 (1979).
3. E. Ross, *Curr. Anthropol.* **20**, 151 (1979).
4. N. Chagnon and W. Irons, Eds., *Evolutionary Biology and Human Social Behavior: An Anthropological Perspective* (Duxbury, North Scituate, Mass., 1979).
5. J. Krebs and N. Davies, Eds., *Behavioural Ecology* (Sinauer, Sunderland, Mass., 1978).

Erratum: In the caption to the picture accompanying the review of *Solar System Plasma Physics* by Michael C. Kelley (18 Jan., p. 297) the date of the launching of Explorer I should be January 1958.

Erratum: In the list of recent recipients of the National Medal of Science (News and Comment, 25 Jan., p. 387), Lyman Spitzer, Jr., should have been identified as professor of *astronomy* at Princeton University.

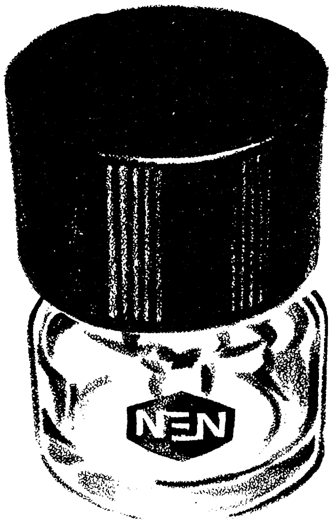
Erratum: In the report "Aborginal Indian residence patterns preserved in censuses and allotments" by John H. Moore (11 Jan., p. 201), Table 1 was inadvertently omitted:

Table 1. Distances from mothers' to married children's allotments for first-generation descendents of Sand Creek family heads.

Choices	Distance (miles) Daughters (N = 23)	Distance (miles) Sons (N = 14)
Near	0.5	0.5
	0.5	1.0
	0.5	3.1
	1.0	
	1.0	
	1.3	
	1.6	
	1.9	
	2.2	
	2.4	
	2.4	
	2.8	
	3.0	
	3.7	
	4.5	**4.5**
Far	5.5	18.0
	5.5	18.8
	9.0	21.2
	15.1	21.3
	16.6	25.0
	19.3	25.2
	35.0	31.5
	36.6	32.9
	37.1	41.4
		46.9
		47.5

74 Research Assistants for

Receptor Site Studies



α-Adrenergic
Clonidine hydrochloride, [4-^{3}H]-
Desmethylimipramine hydrochloride, [2,4,6,8-^{3}H]-
Dihydro-α-ergocryptine, 9,10-[9,10-^{3}H(N)]-
WB-4101 (2,6-Dimethoxyphenoxyethyl) aminomethyl-1, 4-benzodioxane, 2-[*phenoxy*-3-^{3}H(N)]-
Epinephrine, *levo*-[*methyl*-^{3}H]-
Norepinephrine, *levo*-[7,8-^{3}H(N)]-

β-Adrenergic
Carazolol, DL-[3,6-^{3}H(N)]-
Dihydroalprenolol hydrochloride, *levo*-[*propyl*-2,3-^{3}H]-
Epinephrine, *levo*-[*N-methyl*-^{3}H]-
Hydroxybenzylisoproterenol, *p*-[7-^{3}H]-
Iodohydroxybenzylpindolol, [^{125}I]-
Isoproterenol, DL-[7-^{3}H(N)]-
Norepinephrine, *levo*-[7,8-^{3}H(N)]-
Propranolol, L-[4-^{3}H]-

Aspartate
Aspartic acid, D-[2,3-^{3}H]-
Aspartic acid, L-[2,3-^{3}H]-
Methyl-D-aspartic acid, *N*-[*methyl*-^{3}H]-

Benzodiazepine
Diazepam, [*methyl*-^{3}H]-
Flunitrazepam, [*methyl*-^{3}H]-

Cholinergic
Muscarinic
Acetylcholine chloride, [*N-methyl*-^{3}H]-
Choline chloride, [*methyl*-^{3}H]-
Pilocarpine, [^{3}H(G)]-
Quinuclidinyl benzilate, DL-[*benzilic*-4,4′-^{3}H(N)]-
Scopolamine methyl chloride, [*N-methyl*-^{3}H]-

Nicotinic
Acetylcholine chloride, [*N-methyl*-^{3}H]-
α-Bungarotoxin, [^{125}I]-
Choline chloride, [*methyl*-^{3}H]-
Tubocurarine chloride, *dextro*-[13′-^{3}H(N)]-

Dopaminergic
ADTN Amino-6,7-dihydroxy-1,2,3,4-tetrahydronaphthalene, 2-[5,8-^{3}H]-
Amphetamine sulfate, D-[^{3}H(G)]-
Apomorphine, [8,9-^{3}H]-
Chlorpromazine, [^{3}H]-
Dihydroxyphenylethylamine, 3,4-[*ethyl*-1-^{3}H(N)]- or [*ethyl*-2-^{3}H(N)]-
Haloperidol, [^{3}H(G)]-
Propylnorapomorphine, *N*-[*propyl*-^{3}H(N)]-
Spiroperidol, [1-*phenyl*-4-^{3}H]-

GABA
Alanine, β-[3-^{3}H(N)]-
Aminobutyric acid, γ-[2,3-^{3}H(N)]-
Dihydropicrotoxinin, α-[8,10-^{3}H]-
Isoguvacine hydrochloride, [^{3}H]-
Muscimol, [*methylene*-^{3}H(N)]- or [4-^{3}H]-
Nipecotic acid, [*ring*-^{3}H]-

Glutamate
Glutamic acid, L-[3,4-^{3}H]-

Glycine
Glycine, [2-^{3}H]-

Histamine
H_1
Histamine, [^{3}H(G)]-
Pyrilamine, [*pyridinyl*-5-^{3}H]- (Mepyramine)

H_2
Histamine, [^{3}H(G)]-

Opiate
Dihydromorphine, [7,8-^{3}H(N)]-
Enkephalin (5-L-leucine), [*tyrosyl*-3,5-^{3}H(N)]-
Enkephalin (5-L-methionine), [*tyrosyl*-3,5-^{3}H(N)]-
Enkephalinamide (2-D-alanine-5-L-methionine), [*tyrosyl-ring*-2,6-^{3}H]-
Ethylketocyclazocine, [9-^{3}H]-
Morphine, [6-^{3}H(N)]-

Serotonin
Hydroxytryptamine binoxalate, 5-[1,2-^{3}H(N)]-
Hydroxytryptamine creatinine sulfate, 5-[1,2-^{3}H(N)]-

Steroid
Androgen
Dihydrotestosterone, [1,2,4,5,6,7,16,17-^{3}H(N)]-
Methyltrienolone, [17α-*methyl*-^{3}H]- (R1881)*
Testosterone, [1,2,6,7,16,17-^{3}H(N)]-

Estrogen
Estradiol, [2,4,6,7,16,17-^{3}H(N)]-
Iodo-3, 17β-estradiol, 16α-[^{125}I]-
Moxestrol, [11β-*methoxy*-^{3}H]- (R2858)*

Glucocorticoid
Dexamethasone, [6,7-^{3}H(N)]-
Prednisolone, [6,7-^{3}H(N)]-
Triamcinolone acetonide, [6,7-^{3}H(N)]-

Mineralocorticoid
Aldosterone, D-[1,2,6,7-^{3}H(N)]-

Progesterone
Dihydroprogesterone, [1,2-^{3}H(N)]-
Nor-17α-ethynyltestosterone, 19-[6,7-^{3}H(N)]-
Progesterone, [1,2,6,7-^{3}H(N)]-
Promegestone, [17α-*methyl*-^{3}H]- (R5020)*

*Manufactured by NEN under licensed agreement of ROUSSEL-UCLAF.

Miscellaneous
Dihydroxyvitamin D_3, 1α, 25-[26,27-^{3}H]-
Hydroxyvitamin D_3, 25-[26,27-^{3}H]-
Imipramine hydrochloride, [2,4,6,8-^{3}H]-
Melanocyte stimulating hormone inhibiting factor, [*proline*-2,3,4,5-^{3}H]- (MIF)
Phencyclidine, [*piperidyl*-3,4-^{3}H(N)]-
Reserpine, [*benzoyl*-^{3}H(G)]-

NEN New England Nuclear ®
549 Albany Street, Boston, Massachusetts 02118
Call toll-free: 800-225-1572
(In Massachusetts and International: 617-482-9595)

NEN Chemicals GmbH: D-6072 Dreieich, W. Germany
Postfach 401240. Telephone (06103) 85034. Telex 4-17993 NEN D
NEN Canada Ltd., 2453 46th Avenue, Lachine, Que H8T 3C9.
Telephone 514-636-4971. Telex 05-821808

Circle No. 212 on Readers' Service Card

8 February 1980, Volume 207, Number 4431

SCIENCE

The Eagle and the Bear

Barely a month into the new decade, the fragile texture of Soviet-American forbearance has come apart and the outlook for mutual restraint is dim. SALT II is no longer a starter, the Comprehensive Test Ban Treaty looks little better, and the lid is ready to come off the military budget. Even the course of the American national elections is being reshaped by the actions of those hereditary foes, the Soviet Union and Iran. As winter turns to spring, the world will be maintaining an anxious storm watch. We are back to where we were two decades ago, when a somber President said, "Each day the crises multiply. Each day we draw nearer the hour of maximum danger."

A few years ago social scientists flailed at what they saw as signs of the failures of knowledge. The evidence in that direction is now much more telling. We have a feast of knowledge, but it has not done much to improve political technology. As a case in point, cultural and scientific exchanges with the Soviets, less than a decade old, were meant to reduce tensions and foster mutual understanding. To some degree they did, but it is apparent that the armies of knowledge did not make enough difference. Still, if the hour of maximum danger is drawing closer, there is all the more reason to balance political censure and economic pressure with civil discourse. When governments are not on speaking terms, the burden of such discourse falls by default on others.

More by coincidence than intent, the recently concluded Annual Meeting of the AAAS in San Francisco concerned itself with these matters. The Council voted a strong resolution for control of the nuclear weapons race and for plans to convert nuclear weapons facilities to peaceful uses in phase with arms control agreements. That done, the Council voted its endorsement of a National Academy for Peace and Conflict Resolution. Moreover, the Council mandated a AAAS task force on nuclear arms control and directed that this topic be a major theme of the 1981 Annual Meeting in Toronto. The thrust is not toward a new dance of détente, but rather toward limiting technological terror and extending the search for a stable peace. If Soviet censorship permits these words to be read by scholars within the U.S.S.R., a degree of response in kind is not unthinkable.

The real price that has been exacted by the Soviet strike into Afghanistan is, to be sure, an extinction of that minimum of trust that is necessary to legitimize conflict management between nations. Absent that element, governments and publics have scant choice but to resort to stronger military capability in order to influence an opponent's calculus of risks and consequences. Both science and technology inevitably will be harnessed to that task. And the derivative cost is in the diversion of attention and effort from a host of problems that, left unattended, can lead to as much grief as almost any quarrel between superpowers: swarming population, crushing indebtedness of developing nations, forest and cropland depletion, failure of emerging nations to achieve their expectations with stability, and virulent poverty. The 1980's might have been the decade for inspired uses of science and technology to manage peaceful change and the abatement of incendiary dangers. It could yet be, if our priorities are not unreasonably skewed.

A major discontinuity has been introduced into our working assumptions, with global ramifications. In many ways the ramifications are likely to count for more, in the end, than the discontinuity itself. How they are perceived and understood, and whether they lead to reactive or proactive responses, to sterile reflexes or to a surer grasp of the meanings of the turning century, is the urgent question. The contest between the eagle and the bear is no small part of all this, but it is not the whole of it. That is something to remember.—WILLIAM D. CAREY

Our high-performance desktop computer. Fast. Accurate. Precise graphics.

Our 4052 may be just your speed.

Its powerful 16-bit processor delivers the performance you need to tackle tough data analysis problems. In fact, our 4052 was especially designed for high volume scientific research. Right down to the standard interface (IEEE-488) to hook up to instruments and the optional data communication interface to share data with host computers.

A small desktop computer for big results. It brings your complex projects down to a manageable size and more meaningful form. The 4052 gives you: data array processing, floating point operations with 14 digit accuracy and matrix computational capability. Plus Tektronix' quality line of plug compatible peripherals that copy, print or plot results the way you want to see them.

Precision graphics and powerful software. Tektronix' exclusive display technology yields unmatched clarity and definition. Plus, our graphic-enhanced BASIC gets you into graphics quickly and easily. And to complement your programming skills, you can choose from our applications software packages on statistics, mathematics, analysis, and others. They're proven and ready to use.

Draw your own conclusions. Ask for a desktop demonstration today.
Call: toll-free 1-800-547-1512.
In Oregon, call 644-9051 collect. Or write:

Tektronix, Inc.
Information Display Division
P.O. Box 500
Beaverton, OR 97077

OEM information available on request.

Tektronix®
COMMITTED TO EXCELLENCE

Circle No. 207 on Readers' Service Card