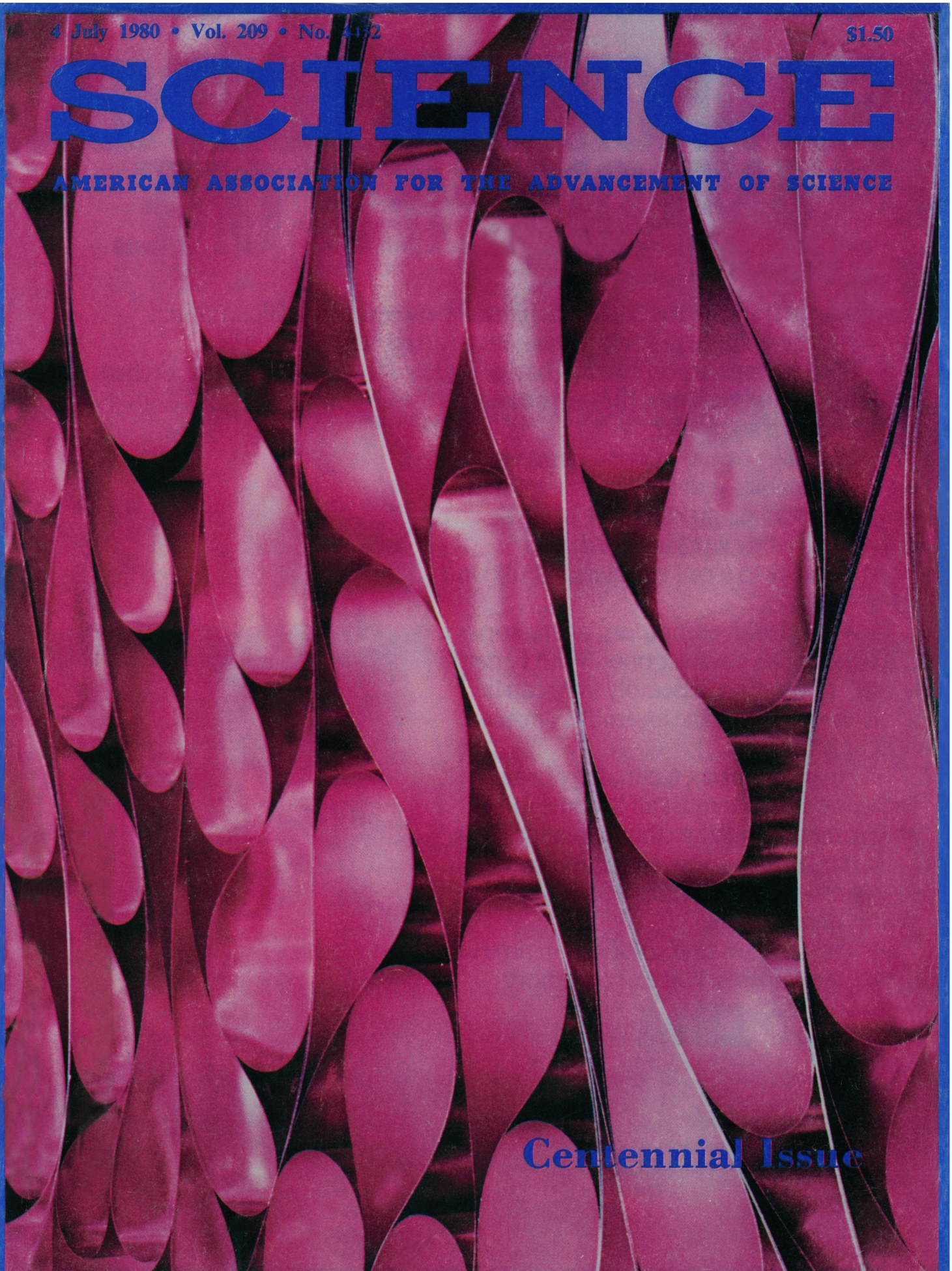
4 July 1980 • Vol. 209 • No. 4452

$1.50

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Centennial Issue

SIX ANCIENT MACHINES. AND ONE NEW ONE.

The first six are the basic machines. The seventh is a silicon chip.

Basic machines provide a mechanical advantage.

Silicon chips are different. They provide a *mental* advantage. Etched with microscopic circuits, they're the heart of the modern computer.

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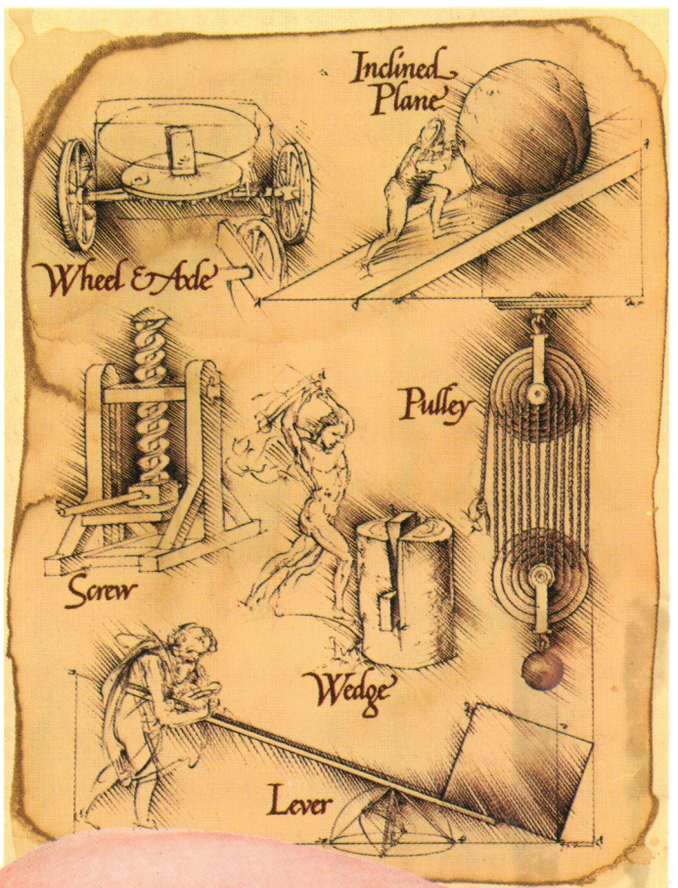
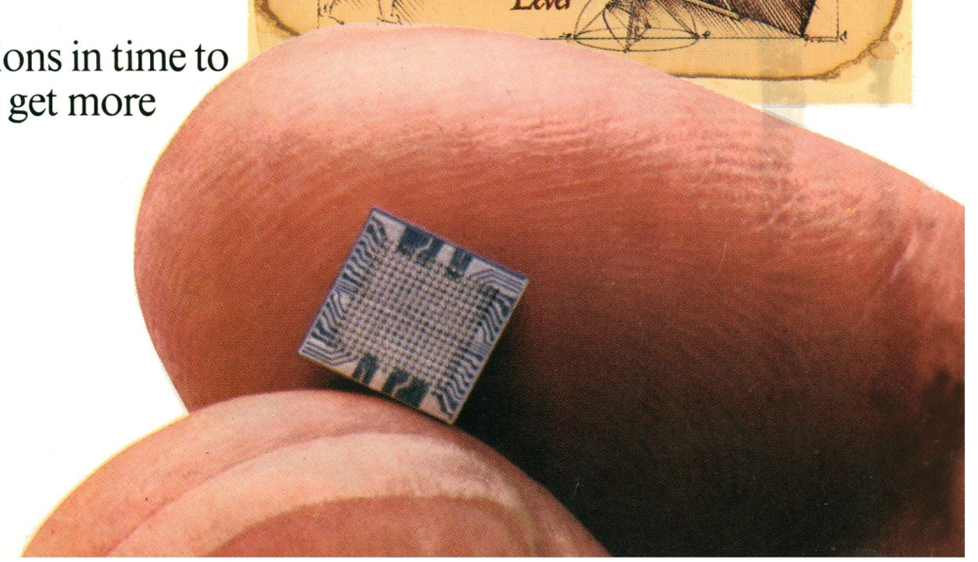
Armed with computers, old factories can behave like younger ones. With better use of information, assembly lines can be made to work with the assemblers instead of against them.

Heavy industry, technology firms, service companies must all become more productive, a challenge that demands ideas.

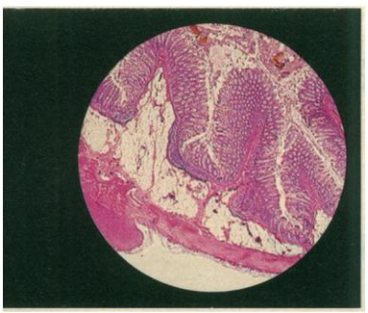
And just as levers alone don't move rocks, computers don't have ideas. But they give us an advantage.

They help us find solutions in time to solve the problems. You can't get more basic than that. IBM®



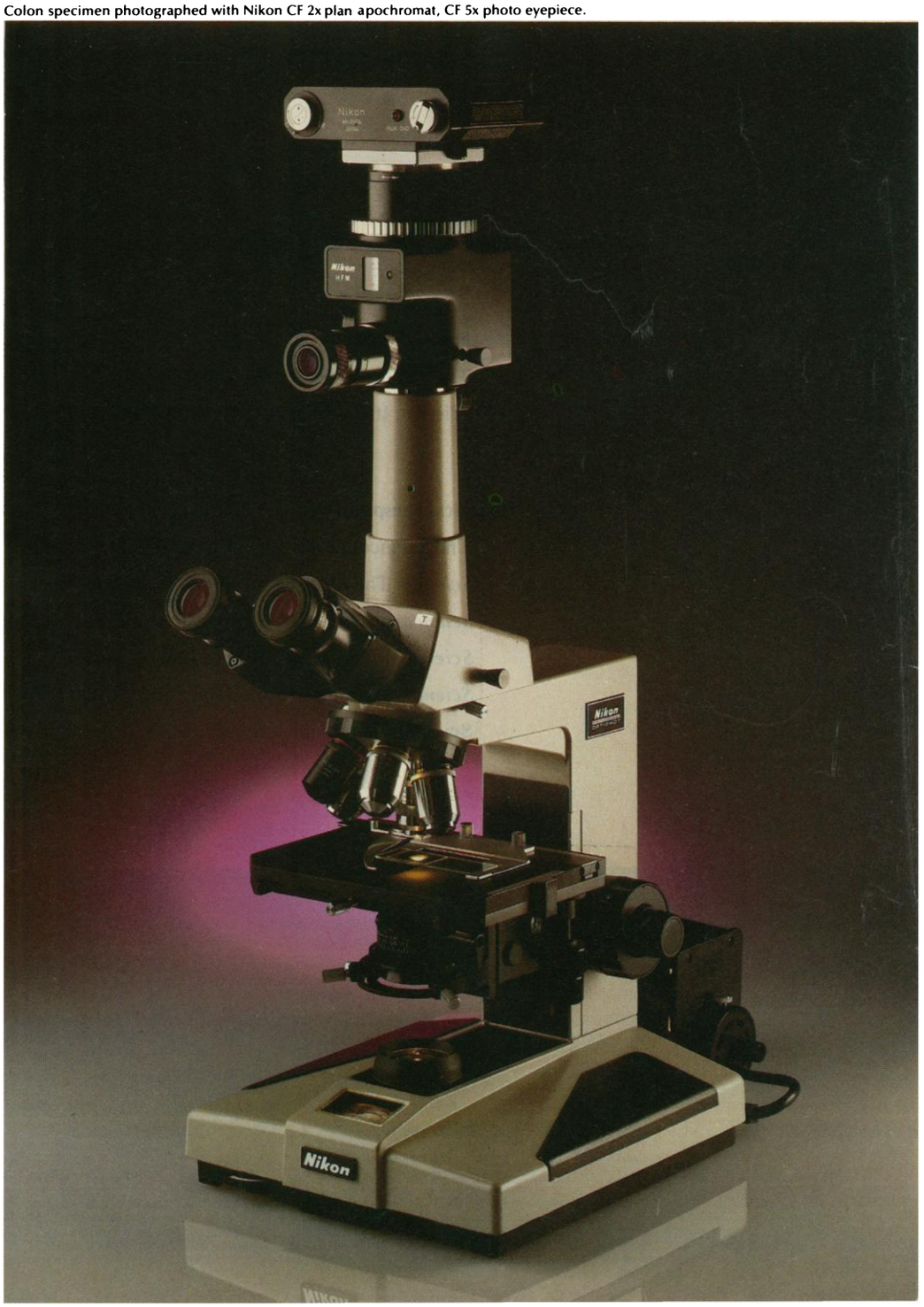


NIKON VISIONS



NIKON OPTIPHOT. THE EASY-TO-USE PHOTOMICROSCOPE WITH TOTAL RESEARCH CAPABILITIES.

Colon specimen photographed with Nikon CF 2x plan apochromat, CF 5x photo eyepiece.



INSTRUMENTATION
Nikon Optiphot microscope equipped with HFM Microflex photomicrography system.

SIGNIFICANCE
Through design innovations Nikon has produced a complete microscope and camera system capable of delivering consistently accurate photomicrographs with maximum speed and convenience.

SPECIFICS
The Nikon Optiphot combines exclusive CF optics for images with full edge-to-edge sharpness, remarkable contrast and superior resolution with a totally new mechanical design. The massive base and rigid stand eliminate any vibration, while a constant color temperature 50 watt halogen Koehler illumination system provides enough light for any requirement. Images snap into crisp, sure focus with the ultra-precise focusing mechanism.

The HFM Microflex camera system consistently captures the superb images delivered by the Optiphot. It features totally automatic, computer-controlled exposure selection, electronic shutter and motorized film advance. The system can be adapted for Polaroid® or large format photography.

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Nikon
Extending Man's Vision

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4 July 1980
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SCIENCE

Science Centennial

3 July 1880 to 4 July 1980

Edited by Philip H. Abelson and Ruth Kulstad

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Present and Future Frontiers of the Sciences

Status and Future of Applied Sciences

Interaction of Science and Technology with Societal Problems

COVER

Metallic glass ribbon cast directly from liquid metals at high speed. Such ribbons are expected to be useful in magnetic devices for reducing energy consumption and weight. [Courtesy of Allied Chemical Corporation, Morristown, New Jersey]

Timely topic for our 100th birthday.

Photography is wonderful. Press the button and make time stop. By and large, that's why so many buttons have been pressed over the century. Make an instant last.

How long? Cheerful folk don't ask. That's no way to stay cheerful. Nevertheless, here are a few thoughts for resolutely objective minds that insist on grappling with the question:

- All dyes change in time. Even if Kodachrome film had been available, the people in charge of King Tut's funeral made a better choice in that gold mask.

Filamentary silver in the absence of oxidants does well, too. The stuff it's suspended in to constitute a black-and-white photograph tends to go, though, as time starts rolling by.* Extreme care in processing and in control of temperature, light, humidity, and ambient pollutants during storage makes a big difference.

*At least we suppose so. Insufficient real time has rolled by to speak from experience.

- The recently issued Kodak Publication F-30, "Preservation of Photographs," shown above, can be ordered from photographic dealers and booksellers.
- To rejuvenate images from antique black-and-white plates and films, some professional photographers offer a service based on Kodak professional direct duplicating film, type SO-015.
- To give a color image of extraordinary historic or artistic value the archival longevity of a black-and-white image, it can be stored as a set of separation negatives.
- Without going to this extreme, a fine color photograph can delight the eye for many years of daily encounter. There has been much progress on image dye stability in the 40 years since color photography opened up to all.

1880 Kodak 1980

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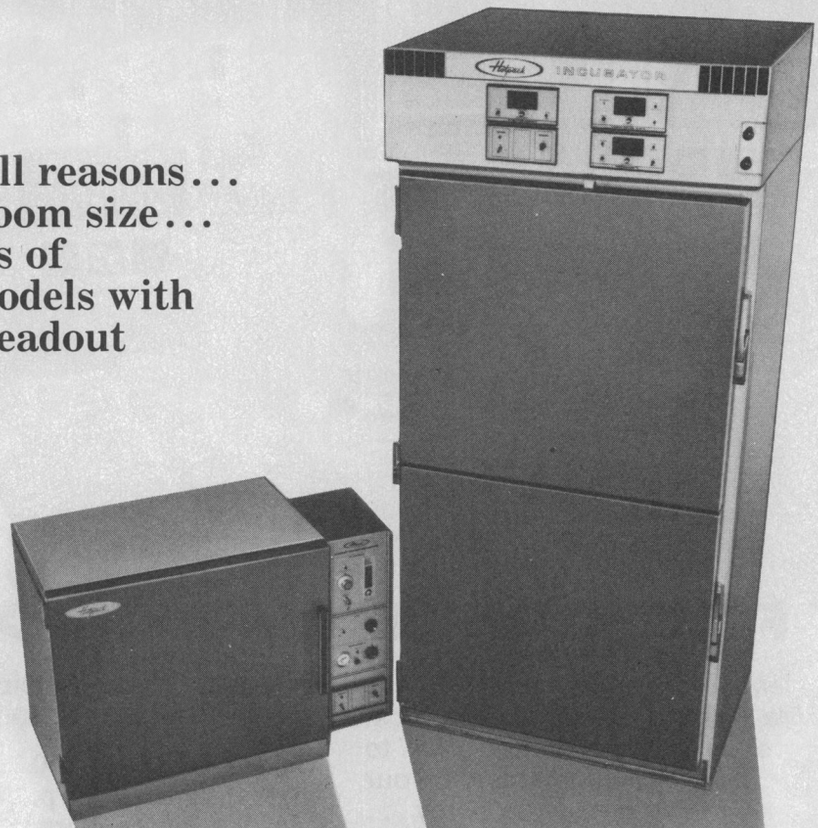

incubators for all reasons... from bench to room size... including dozens of *multi-mode* models with digital set and readout

Reliability! There's no substitute for it. Especially in an incubator.

You expect an incubator to provide accurate, consistent performance and Hotpack designs to meet your greatest expectations.

Hotpack packages reliability in a full range of standards from 6 to 50 cubic feet. CO_2 incubators. Mechanically-convected and water-jacketed incubators. Temperature ranges down to 0°C and up to 60°C. 0 to 20% CO_2 and up to 98% RH. Heated-only models and one, two and four-door models—some with the working space of a 4' x 6' room—even refrigerated benchtops.

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H-156

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1. AN ELECTRONIC TOP LOADER should give you speed and convenience—at a price you can afford. Ohaus delivers all three. An accurate reading displayed within 3 seconds. The balance lets you know it's stable by lighting a bright red "g". And there's no chance of misreading the big display: it's angled for wide visibility, covered with a non-glare lens and easily seen from across the bench or across the lab. To prevent you from accidentally "erasing" your work, the tare bar is carefully recessed. Ohaus Model 300 electronic balance—300 g capacity x 0.01 g sensitivity. Other models: 1500 g x 0.1 g, and dual-range 1500 g x 0.1 g/150 g x 0.01 g.

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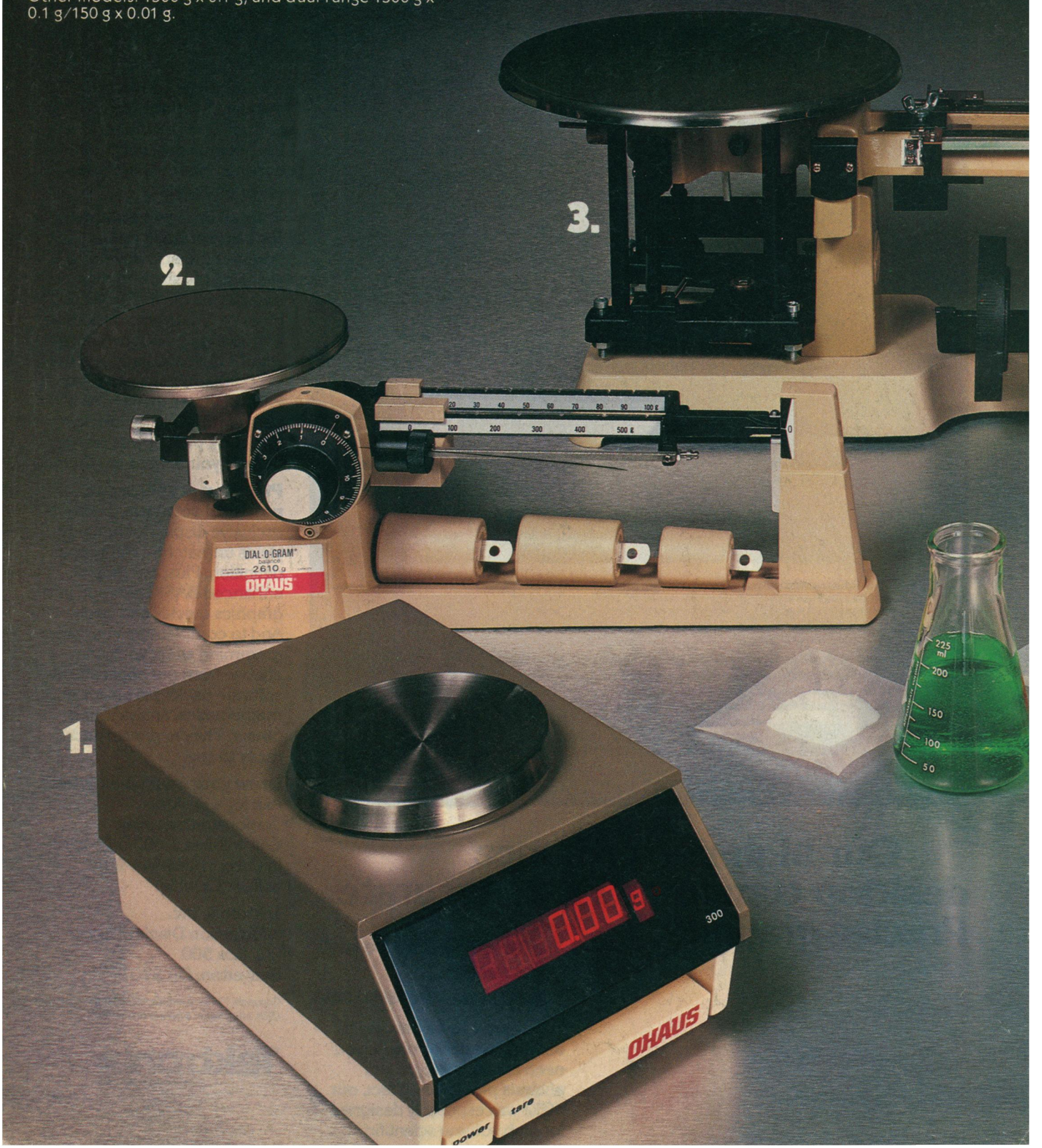

3. A HEAVY DUTY BALANCE has to accommodate anything from a 50 ml beaker to a full sheet of plywood—and weigh it to an accuracy of 1 gram. That's why the Ohaus Model 1119 D balance has a totally unobstructed, oversized 11-inch stainless steel pan plus an end-reading, parallax-free indicator. It can be viewed from either side and from a distance. Rugged cast construction assures that the 1119 D balance will survive the inevitable shocks and overloads. Precision knife edges are protected by a positive load stop—they can't be damaged. This translates directly into years of no maintenance/no recalibration dependability. Ohaus Heavy Duty Solution balance Model 1119 D—20 kg x 1.0 g.

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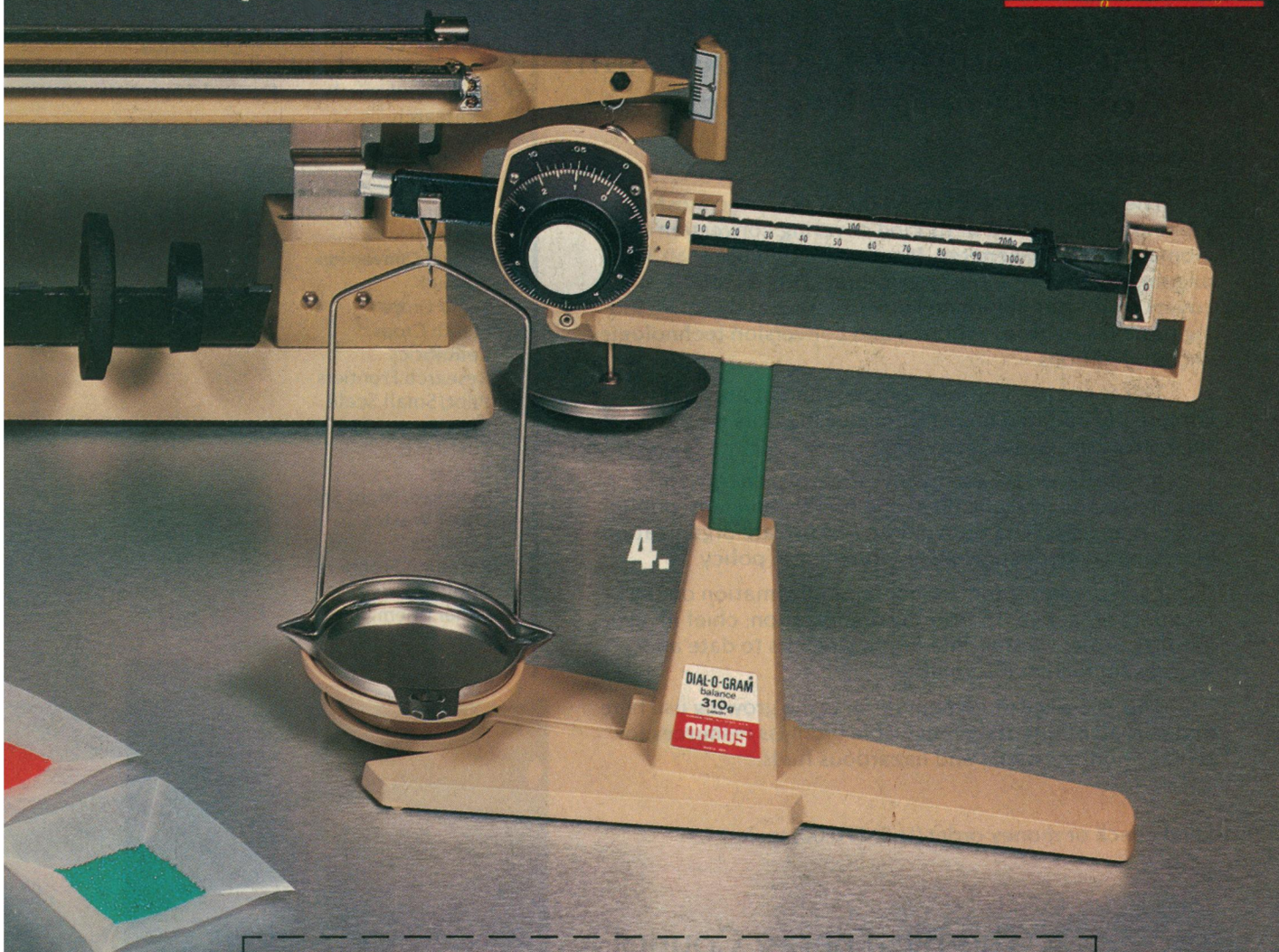
Now that you know what to look for in a lab balance...Ask for Ohaus.



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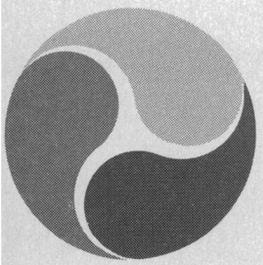

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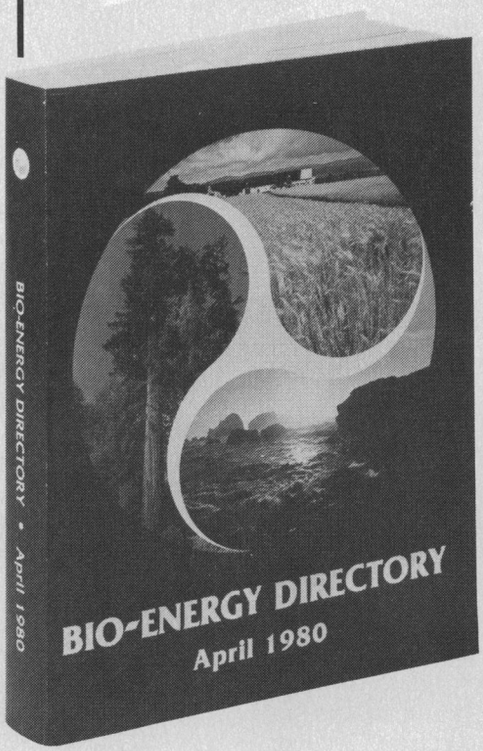


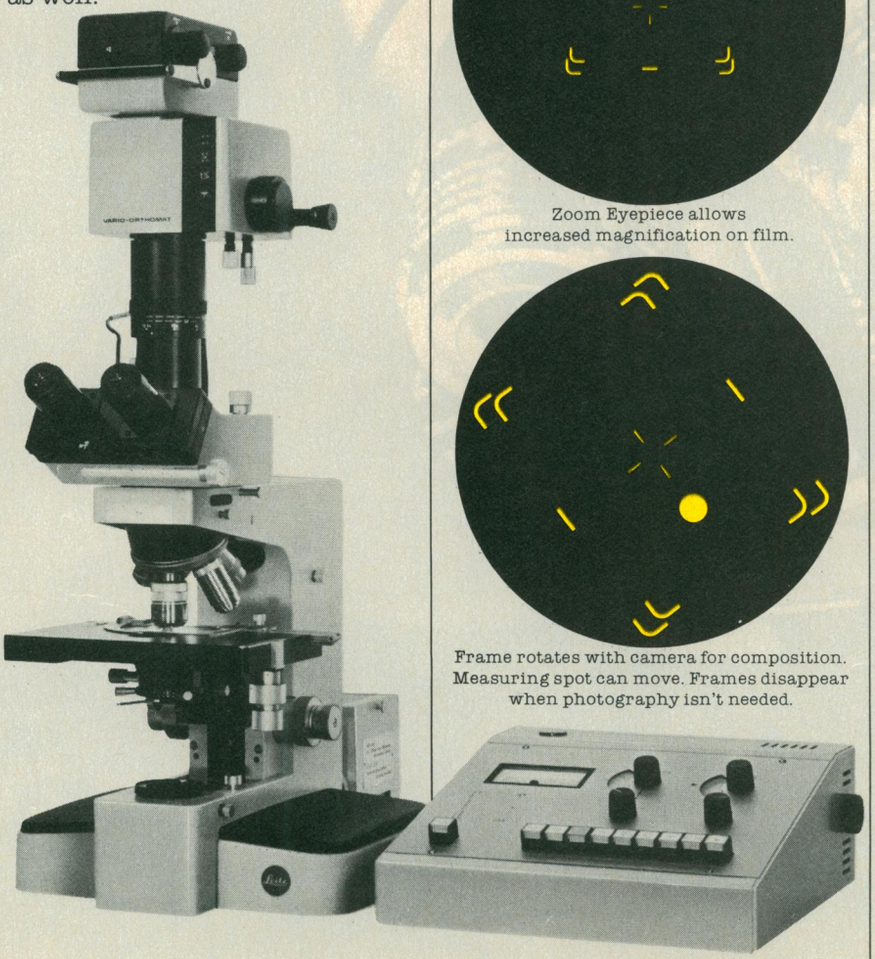
1509

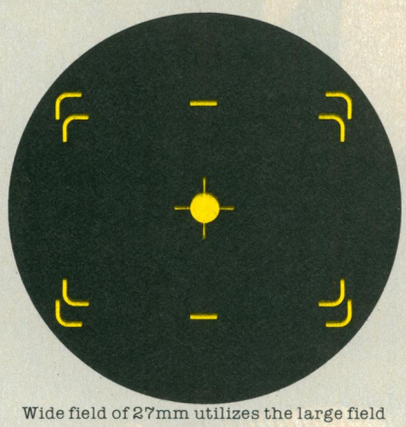
Introducing the Vario-Orthomat. It turns every Leitz microscope into a state-of-the-art photomicroscope.

The Vario-Orthomat® multiformat camera system provides all Leitz® microscopes with five advanced photographic advantages never before achieved in an automatic camera. And they're only the beginning of its extraordinary capabilities.

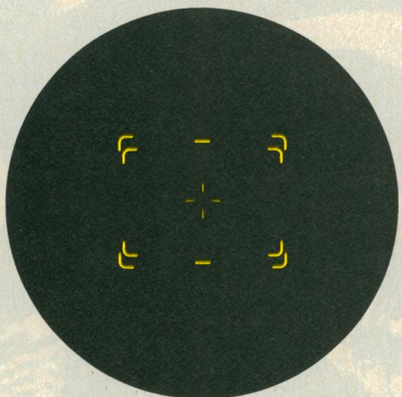
1% Movable Spot Measurement.

The measuring spot you pick is projected into the binocular tube. It can be moved to a representative detail and automatically determines the precise exposure for it. This is a major advantage for fluorescence, darkfield and polarized light photomicrography. 100% Average area readings are selectible as well.





Wide field of 27mm utilizes the large field of plano-objectives. Spot measurement for fluorescence, darkfield and polarized light.



Zoom Eyepiece allows increased magnification on film.

Frame rotates with camera for composition. Measuring spot can move. Frames disappear when photography isn't needed.

Format Outlines.

The proportions of the film size are projected in bright yellow. The intensity of this display can be varied. As you rotate the camera, the projected frame also rotates.

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The Leitz Zoom Eyepiece has a 1:2.5X range which means any intermediate magnification can be obtained. At its lowest setting, you can photograph the entire field projected by a plano-objective.

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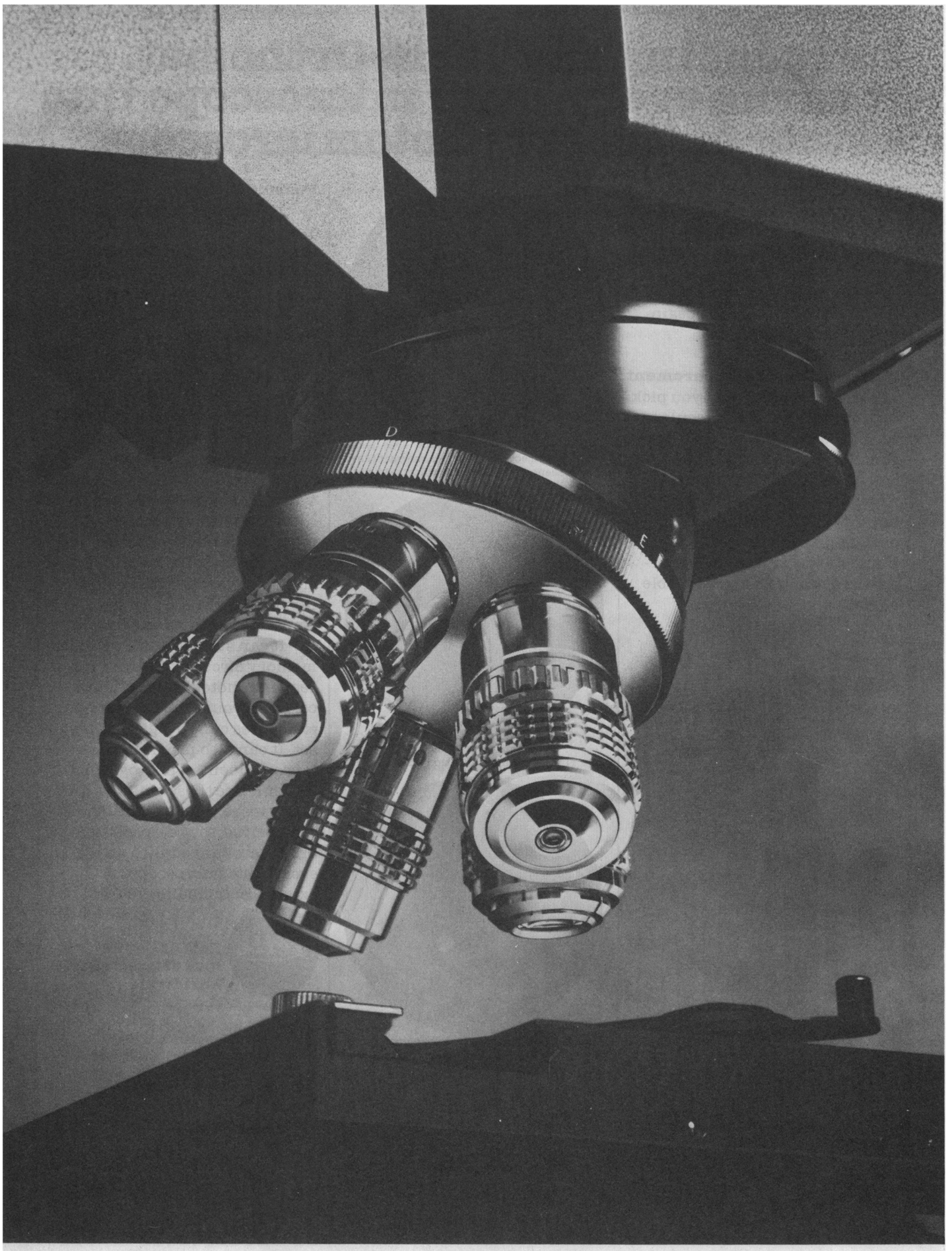
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We've just added higher resolution and contrast to Olympus Vanox. Introducing: new Olympus LB objectives.

Our new LB objectives are measurably clearer and provide higher resolution and contrast than our Vanox universal research microscope ever offered. Considering the objectives they superceded, that's quite an achievement.

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Long-barrel construction offers more room for optical improvements, such as the convenience of parfocality at every objective magnification from 1.0X to 100X. Even the matching eyepieces make observation easier: by shortening the distance from eyepiece shoulder to image plane, we give you a wider visual field (our new standard eyepieces have a field number of 20), while keeping a comfortable 18.8mm eye relief, enough even for eyeglass wearers.

And because the Vanox is a truly universal microscope, the LB series will include LB Plan Apochromats, Plan Achromats, Phase Plan Achromats, Fluorites, Achromats and other objectives.

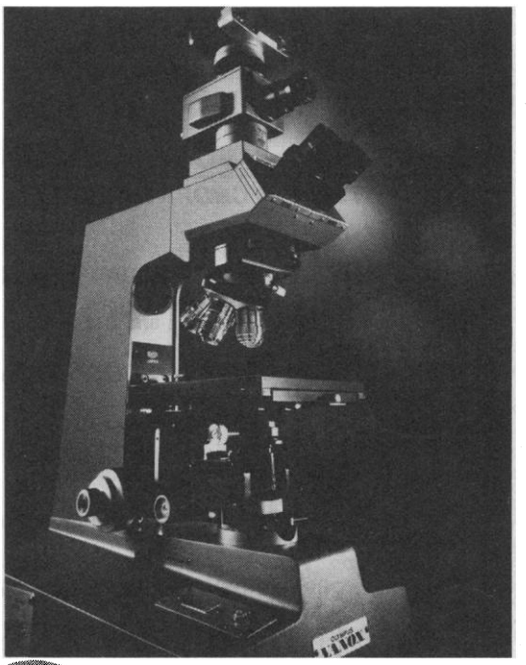
But optics are just part of the Vanox story, for the Vanox is more a system than a microscope. Based on a frame whose ultra rugged construction assures rock-steady, vibrationless observation and photomicrography, the Vanox system includes optical, mechanical, illumination and photographic modules for virtually every research need: phase contrast, differential interference contrast (after Nomarski), fluorescence, polarized light and darkfield illumination—available in most cases for transmitted as well as incident light.

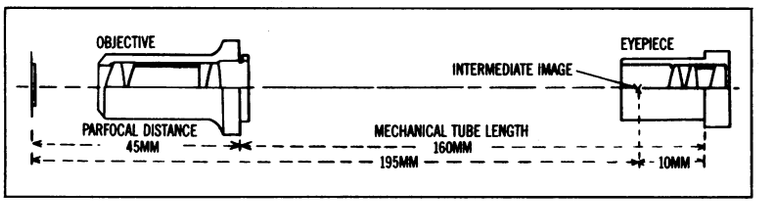
Options for photomicrography include accessories for large-format film or Polaroid packs, as well as for 35 mm film, with manual or automatic exposures up to 32 minutes, advanced color temperature regulation and data imprinting.

Human engineering, however, is not an option—it is basic to Vanox design. When a microscope system is designed to grow with your changing research needs over the next decades, its operation must be as comfortable and natural as it is precise.

The Vanox is the culmination of 60 years of Olympus microscope design and manufacturing experience.

Write for a free brochure describing the Vanox and its LB objectives. Or for a demonstration, see your Yellow Pages for the National Olympus Sales & Service Network.





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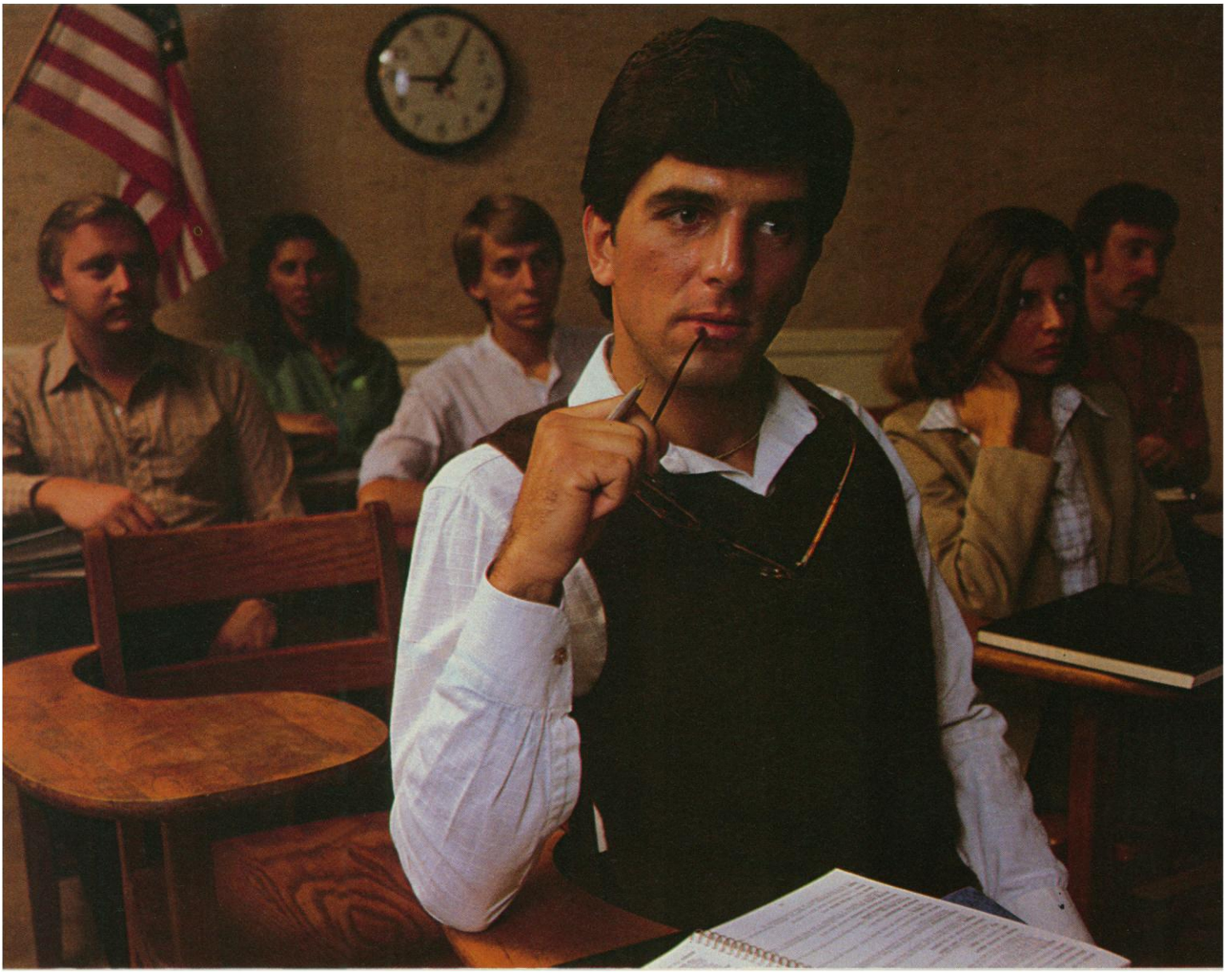

The new 32/7780 outperforms any mini in its class.

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Unlike the competition, this big mini is easily adapted to the task at hand through its modular construction. "Mirror-image" high-speed floating point and scientific accelerator options are packaged into the 32/7780 for a balanced system that is higher in performance and transparent to the MPX operating system. No special user software modifications are required. For the OEM, attractively priced nuclei systems are also available. You only pay for exactly what you need.

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4 July 1980, Volume 209, Number 4452

SCIENCE

The Next 100 Years?

In determining the behavior of humans, excuses seem to be more important than reasons, and one of the functions of the human brain is to find excuses for doing things that are reasonable to do. A centennial is one such excuse. There is no scientific reason why we should celebrate the number 100. The decimal system is only a convenient way to count, derived from the accident that we have ten fingers. The only case for celebrating such an uninteresting and mediocre number as 100 is that it stands roughly for the extreme limit of the single human life. It is, therefore, a good excuse for reminiscing about the past and looking forward into the future.

This is a good occasion, therefore, to think about the next 100 years. Will *Science* still exist? Will science itself still exist? The probability of nuclear war has risen so sharply in the last year that the most probable future in 2080 might be that *Science* will long have ceased to exist, or that something like it might be published in Tasmania, and that science itself will survive, if at all, only in scattered enclaves in a ravaged world. The dismal sequence—science gives knowledge, knowledge gives power, power destroys us—may be the writing on the wall at festivals of science. There is an uncomfortable gap between the wisdom of the folk and the ethos of science. How much ignorance is bliss, and how much curiosity killed the cat? If science leads to nuclear holocaust, may we not expect an immense revulsion of the survivors against it? Much short of this, do we see in Iran the beginnings of a folk revolt against the all-conquering empire of science-based technology?

This is not much of a speech for a birthday party, so let me light a few candles. There are signs of hope. For the first time, I believe, the Council of the AAAS last January passed a resolution instructing the Association to make "Directing Science Toward Peace" a major theme of the 1981 meetings, and to set up a working group on nuclear arms control, which has been done. Congress has set up a commission to study the formation of a National Academy of Peace and Conflict Resolution; the commission is now actively conducting hearings all over the country and will report by the end of the year. The whole concept of unilateral national defense is in deep intellectual trouble, as it becomes increasingly clear that deterrence cannot ultimately be stable, and that the civilian populations of the world are no longer defended by the armed forces for which their taxes pay, but are merely hostages to them.

I do, therefore, see a future for science, both the magazine and the institution. Ignorance does not lead to bliss, and at least the veterinarian's curiosity can save the cat. But I would like to see a motto on the masthead: "We persuade by evidence and not by threat." The renunciation of threat as a means of persuasion is an essential part of the ethic and culture of science; the use of political threat to enforce ideological conformity is the greatest threat to science itself. Science is a world community that transcends national interests and ideologies. It is a weak community, but it has a deep loyalty to the principles that have made it such a remarkable human achievement.

In the last 100 years *Science* has recorded faithfully an extraordinary growth in human knowledge, especially of the physical and biological world. In the next 100 years I see it recording a great growth in knowledge about human learning itself, through which we can learn how to use power for human betterment, and not for human destruction.

—KENNETH E. BOULDING

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