The Beckman 21,000 rpm refrigerated centrifuge offers more than just a pretty face.

People like the handy work surface on the top, the door that neatly pivots out of the way, the faster acceleration/deceleration that allows several more runs a day, the highly efficient drive that always gets rotors up to top speed, and the high performance rotors—there's one for continuous flow work that processes up to 45 liters/hr.!

Even with all these modern features, the J-21 costs less than the others—now only $2875.

No wonder it's the popular machine.
A new theory called plate tectonics is revolutionizing our understanding of the planet we call home.

It provides the first adequate explanation of the mountains that have awed man for centuries ... and the volcanos and earthquakes that have filled him with terror.

We of the CIBA-GEIGY Corporation family are proud to present this great advance in fundamental scientific knowledge, from the very frontiers of geological research in:

“The Restless Earth”
A Public Broadcasting Service Color Special
Produced by NET
February 28, 1972
Check local television listings for time and station.
Dispense a series of pre-set, micro volumes

Now you can gather and dispense six different micro-liter samples from a common reservoir ... in seconds. You simply pre-set the stops, connect your vacuum source to the side-arm of the Microliter syringe, and pull the plunger up. The syringe is filled and debubbled automatically every time you lift the plunger. It is more accurate to ±1% and considerably faster (about 15 seconds for 6 samples) than manual pipetting or automatic dilutors for hematology, ch oride determinations, multiple enzyme determinations, and similar dilutions. If you need to dispense small volumes, try our Aliquanter. Our liquid dispense is described in our catalog — let us send you a copy. Write Hamilton Company, Post Office Box 307 Whittier, California 90608.

HAMILTON
Here's an extremely narrow band tunable source of energy that allows you to apply some exciting new techniques to your experiments. Consider these possibilities: • Selective initiation of chemical reactions by direct excitation of vibrational and electronic levels • Excitation of chemical bonds to study intramolecular energy transfer • Atmospheric absorption measurements for air pollution research • Molecular beam—optical beam interactions • Measurement of excited state lifetimes.

This high power, diffraction limited radiation can be used for long path gas phase experiments or can be sharply focused to give high energy densities in small sample volumes. Stability is ±0.002 cm⁻¹/hour.

Performance of this new system has been proven by several units already at work in leading research facilities. You can add this new capability to your laboratory now, either as a complete system or as the Model 1020-1 modular accessory for your present Chromatix system.

Visit us at the Pittsburgh Conference, March 6-10, Cleveland; FASEB, April 12-16, Atlantic City; International Quantum Electronics Conference, May 8-11, Montreal. Or contact our home office for specifications and prices.

Another first from the leader in tunable lasers...

Chromatix ...for the control of light

1145 Terra Bella Avenue / Mountain View, California 94040 / (415) 969-1070
Until the new Cary 118 you could always judge a spectrophotometer by its cover.

The brushed aluminum trim, flashing digits, and slick new nameplate would lead you to believe this is one of those other UV-VIS spectrophotometers. The kind that rely on cosmetics to compensate for lack of performance.

But rest assured. The new Cary 118 combines the exceptional performance of the Cary 16 with the operational ease of the Cary 15. In fact, the features include a double monochromator, a digitally coupled wavelength scan and chart drive, and a photometric accuracy of 0.001 at 1 absorbance.

It also offers a pay-as-you-progress feature. Sort of modular, but not the add-a-box approach. Start with the basic manual spectrophotometer at $9,950. Later slip in a recorder. Then, later yet, a scanning mechanism. Or you can have the complete recording/scanning version all at once for $14,450. Either way, you end up with the identical instrument.

The recorder itself is a brand new design. For example, the pen drive has no cables or gears, so there's no backlash. And no detectable pen dead zone.

Service accessibility is another thing we kept in mind. All the solid-state electronics are in a roll-out drawer, and everything can be reached from the front.

Even the brochure describing the Cary 118 is a handsome new design. Write for one. Cary Instruments, a Varian subsidiary, 2724 South Peck Road, Monrovia, California 91016. Ask for data file E202-22.
The new Reichert OmU3 Ultramicrotome: exclusive darkfield alignment permits fast, one-pass positioning.

The new OmU3’s unique darkfield alignment system enables the operator to position the knife in one pass, quickly and positively, without damaging specimen or knife. Its simple operation makes technician training easier, saves sectioning time, and greatly reduces the chance for error.

Another exclusive feature is instant start/stop thermal feed. Sectioning can be stopped and a section removed. Without delay or readjustment, sectioning may be resumed at the originally set thickness. Cutting and recycling speeds are controlled independently. Sections can be cut at slow speeds and the knife recycled at a faster speed. The integral Reflexomat water pump allows filling the knife boat remotely to eliminate interruption of serial sections. For a convincing demonstration of the new Reichert OmU3, contact your American Optical representative and send for our new, detailed booklet.

AMERICAN OPTICAL CORPORATION
SCIENTIFIC INSTRUMENT DIVISION • BUFFALO, N.Y. 14215

Circle No. 18 on Readers' Service Card

Through the microscope, the illuminated gap between specimen and knife is seen as a brilliant slit.
If you worry that airborne contamination might wipe out your animals, research, investment, hopes, and good humor... consider a reasonable alternative.

What is that “reasonable alternative”? Our laminar flow STAY-CLEAN™ cage rack.

What does it do? It “bathes” animals with a continuous stream of ultra-clean laminar flow air.

Why? To reduce microbial or other airborne contamination of the colony.

What's the major gain? It helps minimize interruption of research due to animal infection. And, of course, it helps protect the animal colony itself.

Is it too late to ask what “laminar flow air” is?

Hardly. The government describes it this way: “air flow in which the entire body of air within a confined area moves with uniform velocity along parallel lines, with a minimum of eddies.” We think of it as: “unidirectional, non-turbulent air flow.”

You say this laminar flow air is ultra-clean too? Yes, it's been filtered to remove all potentially harmful particles 0.3 microns or larger.

This sounds like a practical way to reduce the hazards and frustrations of working with small laboratory animals. It is. It is.

Are people now using this laminar flow cage rack for these reasons? Yes, indeed. You'll find the STAY-CLEAN rack at NIH, Merck, the VA, Cornell Medical College, and MIT, to name a few.

How do I learn more? Simple. Write “Stay-Clean” on a postcard and then add your name, address and zip code (please). We'll send a folder. Carworth, New City (Rockland County), New York 10956.

Carworth
Division of Becton, Dickinson and Company
How many spectrophotometers can give you a benzene spectrum with this much resolution, baseline flatness and photometric precision for under $5000?*

Only one. The new Heath/Schlumberger 721 UV-Vis Ratio-Recording Spectrophotometer: $4995

*Better than 0.1 nm resolution, better than 0.001 A baseline flatness, better than 0.001 A photometric precision.

Make a believer out of yourself...stop by booth 1116 at the Pittsburgh Conference or use the coupon to send for our 16-page brochure describing the new 721 system. It even includes a complete full-size benzene scan so you can make a detailed inspection of the results illustrated here.

Heath/Schlumberger Scientific Instruments
Dept. No. 560-19
Beeton Harbor, Michigan 49022

☐ Please send your new 721 system brochure to help me become a believer.

Name ____________________________
Title ____________________________
Address __________________________
City ____________________ State __ Zip __

Prices and specifications subject to change without notice. EK-324
RAPID CYTOPHOTOMETRIC ANALYSES
OF TISSUES WHICH CAN BE PREPARED
AS SINGLE CELL SUSPENSIONS CAN NOW
ROUTINELY BE CARRIED OUT WITH THE
CYTOGRAF® AND THE CYTOFLUOROGRAF®
MANUFACTURED BY BIO/PHYSICS SYSTEMS INC.

THEM ANALYTICAL INSTRUMENTS PROVIDE
A RANGE OF CAPABILITIES, FROM CELL
COUNTING TO EXTREMELY FAST FLOW-THROUGH
SCATTER/ FLUORESCENT CYTOPHOTOMETRY

THE CELLS IN SUSPENSION ARE CARRIED IN
SINGLE FILE FASHION THROUGH A STABLE
LASER BEAM (SHOWN AT RIGHT). THE FLOW
SYSTEM UTILIZES DOUBLE STREAM LAMINAR
FLOW WITH IN-LINE FILTERING TO MINIMIZE
CLOGGING. A NUMBER OF OPTICAL INTERACTIONS
WHICH INCLUDE SCATTER IN TWO ANGULAR
RANGES AND, IN THE CASE OF THE
CYTOFLUOROGRAF, TWO WAVE-LENGTH
FLUORESCENCE, ARE SIMULTANEOUSLY
ANALYZED IN TWO ELECTRONIC CHANNELS
AND DISPLAYED AS HISTOGRAMS AND
TWO-DIMENSIONAL
SCATTER DIAGRAMS.

A close look at a new technology...

THE INSTRUMENTS CAN
FUNCTION AS COUNTERS
AND MULTI-PARAMETER PULSE
HEIGHT ANALYZERS FOR SIZING
CHARACTERIZING, IDENTIFICATION
AND DIFFERENTIAL COUNTING OF
SUB-POPULATIONS OF THE
SUSPENDED CELL SAMPLES.

THESE INSTRUMENTS ARE
MANUFACTURED, WARRANTED
AND SERVICED BY
BIO PHYSICS
SYSTEMS, INC.

MAHOPAC, NEW YORK 10541 (914) 628-7451


Circle No. 19 on Readers' Service Card
Now, Automatic Quantitative Microscopic Image Analysis—from Zeiss!

We've added a unique precision scanning stage to our great optics, and the result is the most sophisticated system ever made for microphotometry. It's the Zeiss Scanning Microscope Photometer 05 for all types of photometric measurements in transmittance, absorbance, reflectance and fluorescence...and either on-line or off-line computer analysis. Cancer cytologists have already found it an invaluable tool...and other applications are developing daily in both the life sciences and industry.

Here's what this unusual system consists of:

A Zeiss Universal or Photomicroscope. Any analytical system that utilizes a microscope, no matter how sophisticated the electronics, cannot be any better than its optics allow. Information that's lost in the optical channels will not be retrieved in the electronic channels. That's why it's important to start with world-famous Zeiss optics.

A unique Zeiss precision scanning stage. The two available scanning stages allow, respectively, minimum increments of 0.5 and 10 microns, perform up to 200 steps per second, and travel 75mm and 25mm in the X and Y directions in several different scanning patterns, including meander, comb or line.

Much more. A modular electronic system that permits you to select components as you need them and as your budget permits. All the famous Zeiss accessories and photographic and analytical attachments—everything you might ever need for qualitative and quantitative microscopy—are, of course, available. We can even supply a PDP-12 computer with a number of programs prepared by well-known scientists. For the full story, write Carl Zeiss, Inc., 444 5th Ave., New York, N.Y. 10018. Or phone (212) 736-6070.

Nationwide Service. Circle No. 9 on Readers' Service Card

ATLANTA, BOSTON, CHICAGO, COLUMBUS, DALLAS, DENVER, FORT LAUDERDALE, HOUSTON, KANSAS CITY, LOS ANGELES, PHILADELPHIA, PHOENIX, SAN FRANCISCO, SEATTLE, WASHINGTON, D.C.
When things are happening fast, you don't have time for mistakes.

Whether you're monitoring an ECG or checking cardiac output, a Brush display system won't give you any mistakes.

Highest system accuracy is obtained by an engineered combination of transducers, preamps and recorders...with a system resolution to 1 microvolt.

And because the Brush biomedical system provides 99.5% linearity with rectilinear traces that are always clear, crisp and smudgeproof.

All Brush recording instruments have position servo loop feedback to enforce pen positioning across a 40 or 80mm chart. And exclusive pressurized ink writing is available from 1 to 8 channels with pushbutton selectable chart speeds. Recorders which are portable, cart or rack mounted.

You can rely on Brush when you don't have time for mistakes. We provide complete systems responsibility. And country-wide application/service support. Write for our 36 page catalog. Gould Inc., Instrument Systems Division, 3631 Perkins Avenue, Cleveland, Ohio 44114.
Environmentalists would certainly be avoided if they abided by Stokinger's first and second "commandments": "Standards must be based on scientific facts . . ." and "All standards, guides, limits, and so on, as well as the criteria on which they are based, must be completely documented."

However, in his great zeal to prevent excesses in environmental conservation, I wonder if Stokinger does not himself violate his own "commandments." He implies that excessive (but presumably politically possible) antipollution expenditures could lead to "... economic upheaval approaching disaster." I would call this an undocumented fear. Reasonable arguments could probably be made that large antipollution expenditures could aid our economy almost as much as the same amount of defense spending.

Stokinger tells us that "Already a number of small manufacturing plants have been forced to close, unable to bear the burden of meeting pollution standards." He does not present evidence (or even state) that a significant fraction of these closings were unjustified when economic and environmental considerations were balanced. His argument seems a bit like the "scare tactics" used by overzealous antipollutionists.

I agree with Stokinger that increased costs for pollution control will be passed on to the consumer, but this in itself is not a negative aspect of pollution control. This factor should ordinarily have little relevance in determining whether or not a given antipollution action is justified. We should expect to pay for a cleaner environment, as we pay for improved automobile safety and more advanced medical care.

I quote, without comment (but with my italization), a part of Stokinger's conclusions on "... unnecessarily severe pollution standards," "It should thus be evident that such actions, with their unbearable consequences, should only be taken when it is clear beyond a shadow of scientific doubt that human health is in imminent danger. . . ." Such clarity, of course, is rarely attained.

Chemicals are not "innocent until proven guilty"; they do not have human rights. Unless we treat them as guilty until proven innocent, they will deprive real human beings of their rights to health. The burden of proof must be on the chemicals and their makers—not on the human population.

Charles F. Wurster
Marine Sciences Research Center,
State University of New York,
Stony Brook 11790

The incomplete, seven-point decalogue of H. E. Stokinger can be brought closer to the needed "ecolgue" by adding three commandments, since his strictly anthropocentric concept of environmental health gives short shrift to the health of the environment itself.

8) Remember the planetary ecosystem, to keep it whole. The most important system in which people function is not a medical system, but the planetary ecosystem; its own healthy operation is basic to human health and survival. The "scientific facts, realistically derived" of Stokinger's commandment 1 must not be limited to piecemeal facts derived from specialized "in vitro" laboratory science, but should also encompass an integrated understanding of the nature of the natural ecosystem and the limits of its tolerance to insults.

9) Look upon short-term effects and actions as meaningful chiefly as they influence long-term effects and results, so that man may be long upon the earth. To "determine trends" includes reasonable efforts at projection; the causes of the degradation and attrition of environment have been shown, by and large, to be increasing exponentially. "Osprey, bald eagle, and other fowl" may not be important to the "environmental health" discipline, but they are good indicators of the state of the biospheric life-support system. Concentrating too exclusively on direct, immediate effects of poisons on human health can be extremely short-sighted. Stokinger's claim to sanity and scientific objectivity would be more convincing if he had bothered to learn what is the consensus among ornithologists regarding the "questionable" harm from chlorinated hydrocarbons to other species at the top of the food chain. Perhaps unknowingly, Stokinger is disregarding much pertinent evidence from scientific (not "popular") ecology.

The ruinous concept "shoot first and ask questions afterward" has brought
on a pollution syndrome that present-day "banning" cannot cure for decades, even if such restraint operated effectively anywhere and were being applied worldwide. Neither proviso holds true. The main point of Stokinger's article is the need for restraint against restraints, a half-truth that, like a half-brick, can be thrown quite a distance in this year of ecologic backlash.

10) Honor both economic and ecologic facts and principles, since a viable future for man depends on gradually but surely bringing human ecology into the functional respect presently accorded economics.

ALTON A. LINDSEY
Department of Biological Sciences,
Purdue University,
Lafayette, Indiana 47907

Stokinger calls for the setting of standards for noxious agents in food and environment that are based on scientific facts, with the qualifications that "provisional, tentative, or best judgment standards" may be used when there is "definite need." He states that in the absence of definite need "it is better to withhold [standards] until such time as the facts are in." He apparently overlooks two points.

The first point, emphasized by Alvin M. Weinberg (Letters, 5 Nov., p. 546), is that in many situations (especially with carcinogens and mutagens) practical considerations prevent complete scientific answers, and thus trans-scientific judgments are required for standard setting. The notion that scientific research can provide absolute and definitive data before permissible standards are set for all noxious agents is a relic from the days when toxicologists were concerned only with acute toxic effects in situations where "no-effect levels" could be readily established. Weinberg points out that for some agents a "no-effect level" cannot be determined.

The second point is that although Stokinger modifies his commandment 1, "Standards must be based on scientific facts," to permit, "provisional, tentative, or best judgment standards . . .," it is possible that he could seem, to the casual reader, to be advocating the extensive use of human beings as guinea pigs. This, in fact, is what often happens when there is a practice of permitting widespread use or dissemination of any potentially toxic agent until a "definite need" for its control is demonstrated from studies on animals or humans. This is no longer a tenable public health practice. Prudence often demands action as soon as potential human injury is indicated; prudence will not countenance waiting to take action until the potential injury or harm is in fact an actuality. In addition, if one were to wait for hard scientific data before restricting the use of toxic agents, unconscionably long delays might occur because of limited research resources.

The "seven commandments," to be widely applicable, should be modified to mean that once an agent has been found to be a potential hazard to man, the setting of a "realistic level" for control must be based on available scientific facts, and also a reasonable interpretation of relevant governmental regulations, wise consideration of epidemiologically revealed trends, and use of a reasonable "safety factor" when scientific data are incomplete.

I do not mean to minimize the need for scientific data when permissible standards are being set for noxious agents in food or environment, but hard scientific data are rarely available (and if available are incomplete) when a potential human hazard is first perceived. Our society cannot always wait for such data before acting but must frequently set "provisional, tentative, or best judgment standards" on the basis of potential hazard, rather than demonstrated "definite need."

VICTOR E. ARCHER
Division of Field Studies and Clinical Investigations, National Institute for Occupational Safety and Health, P.O. Box 8137, Salt Lake City, Utah 84108

"Scientists of North America"

Dora B. Goldstein (Letters, 17 Sept., p. 1080) is right to complain about titles as American Men of Science, which imply, however inadvertently, that scientists are always men and never women. The old rule that "the masculine includes the feminine" seems uncalled for here. It is only fair that we male scientists recognize such slight and try to eliminate them. In this case, a title such as Scientists of North America would seem to be most appropriate, since Canadians are also listed.

T. EDWARD REED
Departments of Zoology and Anthropology, University of Toronto, Toronto, Ontario, Canada
New Clark-type electrode assembly can be used with Gilson Model KM or Model K Oxygraphs without modification. The Clark-type electrode eliminates the problems which occur when using a bare platinum electrode with high protein concentrations and particle suspensions such as whole blood and bacteria, and permits the use of the polarographic method in nonconductive solutions. The response time is only slightly greater than that of the bare platinum electrode.

- **SENSITIVITY**
- **RESPONSENess**
- **STABILITY**

A recording oscillating oxygen cathode, the OXYGRAPH is a specific application of polarographic analysis. A single polarizable micro platinum cathode is coupled by a saturated KCl salt bridge to a nonpolarizable saturated calomel reference anode. Instead of recording a complete current-potential curve, only the limiting current (that current which is limited by the concentration of oxygen in solution) is recorded at an applied constant polarizing voltage, of about -0.6 volts with respect to the anode, across the indicator polarizable cathode.

- A micro platinum cathode for recording rapid changes of oxygen concentration in solution
- Large 20-cm span along the y-axis for a high degree of accuracy
- Sensitivity from ten- to a thousandfold greater than that of conventional gasometric methods for O₂ determinations
- Rapidity of measurements and ease of continuous recording permit accurate determinations of very rapid reactions involving molecular oxygen in solution

**EUROPEAN Manufacturing Branch:**
Gilson Medical Electronics (FRANCE)
69, Rue Gambetta • 95 — Villiers-Le-Bel, France

**WRITE!**
**GILSON MEDICAL ELECTRONICS**
Middleton, Wisconsin 53562
Telephone 608/836-1551
Clean, compact, functional, modular... but more important, a flexible, high-performance, reliable, obsolescence-proof scanning electron microscope with unparalleled operational convenience.

**Optimum Performance** User-oriented Etec Autoscan is designed to produce the highest quality image quickly and easily, time after time. Automatic features such as contrast and black-level adjustment, dynamic focus, magnification compensation and gun-bias adjustment, together with an ultra-high 2,500-line recording CRT, all work in harmony to produce optimum performance with minimum effort.

**Unparalleled Operational Convenience** The logic of the control panel is simple and direct. Automation for routine microscopy; manual overides for in-depth research. Every gauge, dial, switch and clearly identified lighted push-button is located for the convenience of the operator. This is clearly a long overdue step in SEM human engineering.

**Obsolescence-proof Modular Design** Whether you buy a basic Autoscan model and add increased capability later, or a model with total in-depth research capability, an Autoscan will not become obsolete. Because all essential components are modularly built by Etec. Future Etec technological advances can be added with little or no modification of the basic unit.

Only a demonstration will prove our second-generation claims are understated. If you're planning to buy a SEM, you owe it to yourself to investigate Autoscan. Call or write.

Etec Corporation
3392 Investment Blvd. • Hayward, Ca. 94545
Telephone: (415) 783-9210

Circle No. 15 on Readers' Service Card
Askew limits his treatment to parasites of animals, legitimately restricting the book’s size. Whether a parasite exploits plant or animal food the basic feeding strategy is the same, however, and this treatment may lead to some misconceptions. The classification of Hymenoptera Askew uses includes, in the suborder Apocrita, the division Parasitica, in which he states that the superfamilies Chalcidoidea (chalcid wasps) and Cynipoidea (gall wasps) contain “many” and “some” parasitic species respectively. Actually, almost all the species of these superfamilies are parasitic, some feeding on plant tissues and others on animal tissues.

It is clear that parasitic insects and parasitoids play an important role in natural populations and in human ecology. Askew has helped us focus attention on this 10 percent of all animal species. He concludes, “I doubt if any group of animals can exceed the scope offered by parasitic insects to the diligent researcher. The field is wide open, the prospect inviting.” I can only concur, and in endorsing this fine book I hope others will come to this realization.

PETER W. PRICE
Department of Entomology,
University of Illinois, Urbana

Worms

Among nematodes there are harmless inhabitants of soil and water as well as dangerous parasites of plants, animals, and man. The damage caused by plant parasites alone is estimated at over $1.5 billion in the United States. Although the negative aspects of the nematodes have given rise to many investigations and publications, as yet no survey of their behavior has been available. Croll’s book is a contribution to the closing of this gap. Its appearance is therefore to be welcomed. It must, however, be borne in mind that the study of nematode behavior is, to use the author’s words, still in its infancy. We may only mention that no electrophysiological investigations exist in this field.

The first three chapters of Croll’s book are concerned with “Approaches to nematode behaviour,” “Movement,” and “Activity, aggregation and swarm-" the following six with responses to light, temperature, chemicals, electricity, gravity, and mechanical stimuli, and the last two with “The mechanism of orientation” and with “General considerations.” Responses to hatching stimuli are unfortunately not included. On the other hand, all nematode groups — zooparasitic, phytoparasitic, and non-parasitic—are referred to. The presentation has the character of a review, chief importance being attached to completeness of literature coverage rather than to elaboration of general statements and theories. It is in fact striking how few clear statements can be made on certain matters, either because only a few investigations are available or because many have been carried out without clear premises. This holds, for instance, for the effects of light, gravity, and temperature on behavior. The author presents the many gaps and contradictions, and herein lies one of the book’s main merits. It is to be hoped that it will indeed help to “form a background to more sophisticated and exact experimental work,” one of its declared aims. Many blanks have yet to be filled in on the map of nematode behavior.

The existence of several misprints as well as errors in the literature list must be mentioned. In addition, German names of authors are written consistently without an umlaut, which might lead to confusion. A more serious objection concerns the author’s use of the term “klinokinesis,” which was coined by Gunn but later rejected by him.

In spite of these objections, Croll’s book will render good service to those interested in nematodes and their behavior.

JAKOB KLINGLER
Plant Protection Division, Swiss Federal Research Station, Wädenswil

Termites as Ecological Agents

In the tropics the termites replace earthworms as the chief decomposers of litter and turners of the soil. Although the two groups are often viewed as ecological analogs in this special sense, the authors of Termites and Soils establish that profound differences exist in their modes of action. The termites, being well-organized social insects, select soil grains preferentially for transport to the surface and other parts of their nests. They penetrate more deeply into the soil (according to one Soviet report, to as much as 70 meters), and they typically cement soil particles into hard casemates that are very resistant to erosion. Being dependent on plant remains for nutrition, they concentrate calcium, magnesium, and potassium in and around their nests. These various activities alter the vegetation locally, render biotopes more patchy in distribution, and set off other, ramifying ecological effects that extend up the food chains all the way to the mammals.

The authors, who are soil scientists employed by the Australian government at Adelaide, have drawn these and many other interesting conclusions from their own recent studies and those of previous researchers. In addition they provide detailed and careful reviews of the food habits, nest architecture, and economic importance of termites, only parts of which overlap related chapters in the well-known 1969 treatise Biology of Termites (volume 1) edited by Kumar Krishna and Frances M. Weesner. Termites and Soils will prove useful not only to specialists on social insects but also to pedologists and biologists interested in the tropical and subtropical land environments.

EDWARD O. WILSON
Biological Laboratories,
Harvard University,
Cambridge, Massachusetts

Books Received


(Continued on page 924)
Super Spinners...

The ultra machines from MSE

Uncompromising quality in centrifuges for sophisticated separatory techniques in all the life sciences. They're rugged, heavy, very quiet, long lasting and give outstanding performance. Unique bottom-located disc is an integral part of the rotor for positive over-speed protection. Automatic quick starting on reaching requisite vacuum. All rotors have full warranty—no derating necessary.

The Super Speed 75 and Super Speed 65 ultracentrifuges have the extremely high centrifugal forces needed for fractionation, isolation, concentration and purification. Infrared detectors, that conform to the geometry of the rotor, provide true temperature control.

The High Speed 25 combines high speed, vacuum, large capacity and temperature stability to handle preliminary preparative work and density gradient applications. The only centrifuge with a capacity of 110,500 x G and five rotors with a maximum speed of 25,000 rpm for under $4300.

For more information on our full line of centrifuges write VWR Scientific, P.O. Box 3200, Rincon Annex, San Francisco, California 94119.

The HS-25 (VWR No. 20635-005)—can't be equalled at $4300.
Maximum Speed—25,000 rpm.
Maximum RCF—110,500 x G.
Choice of 5 angle rotors, up to 6 x 250 ml; 3 swing-out rotors, up to 4 x 60 ml; 3 zonal rotors.
Features both vacuum and a refrigeration system that cools and heats for precise control between −10°C and +40°C.
Plus electronic speed and temperature control, program preselection and a unique overspeed protection system.

The SS65 (VWR No. 20644-006)—extremely efficient preparative ultracentrifuge.
Maximum Speed—65,000 rpm.
Maximum RCF—420,000 x G.
Wide range of aluminum and titanium rotors—choice of 9 angle rotors, up to 8 x 250 ml; 8 swing-out rotors, up to 3 x 70 ml; 3 type B zonal rotors.
Features electronic speed and temperature control, an infrared sensor for precise temperature control between −10°C and +38°C, program preselection and fully automatic sequence of operations, and a unique overspeed protection system. Automatic oil recirculation. Power failure protection system. Complete line of gradient formers and accessories.
Here's a great sweepstakes from Corning.

Imagine! You may win the classic, all-time standard in borosilicate beakers—the PYREX brand No. 1000 model.

And also the classic, all-time standard in automobiles—the Rolls-Royce Silver Shadow.

Classics go together.

Enter our sweepstakes right now. Use the entry form on the next page.

Watch for another great sweepstakes later this year! And remember—insist on PYREX labware from Corning throughout your lab and you can't lose!

**PYREX® brand Beaker Sweepstakes OFFICIAL RULES—NO PURCHASE REQUIRED**

1. To enter, complete official entry blank below, or, on a plain 3" x 5" piece of paper, hand print your name and address.
2. You may enter as often as you wish but each entry must be mailed separately to PYREX® brand Beaker Sweepstakes, P.O. Box 916, Blair, Nebraska 68009. Entries must be postmarked by May 31, 1972, and received by June 15, 1972.
3. The winner will be determined by a random drawing from among all entries received by D. L. Blair Corporation, an independent judging organization whose decisions are final. Winner will be notified by mail. No substitution for prizes is permitted. Entrants must be U.S.A. residents. Prize delivery limited to continental U.S.
AND A ROLLS-ROYCE.
TO DRIVE IT HOME IN.

4. This sweepstakes is void where prohibited, taxed or restricted by Federal, state or local laws and regulations. Employees of Corning, its advertising and sweepstakes agencies, dealers and their families are not eligible. Federal, state and other taxes, if any, are the responsibility of the prize winner.

5. This prize is guaranteed to be awarded. Name of the prize winner will be furnished to anyone sending a stamped, self-addressed envelope to Corning Laboratory Sweepstakes, Corning Glass Works, Corning, New York 14830.

Name of the representative who sells you Corning products, please do:__________________________________________

Count me in! I want to win that PYREX® brand beaker! And the Rolls!

Name Title Organization

Address City State Zip

Not required, but if you wish to list the name of the representative who sells you Corning products, please do:__________________________________________

If you win, he wins $1,000.

PYREX® brand Beaker Sweepstakes, P.O. Box 916, Blair, Neb. 68009

CORNING
Makers of PYREX® labware

Circle No. 11 on Readers' Service Card
The Protein Machine
(and how to analyze it).

If your work involves protein and peptide sequence analysis it will pay to analyze the JAS-47K. Our new and remarkable sequence analyzer.

Start with the price. You'll find ours is below major competition. You'll also find we accommodate both Edman and Dansyl subtractive methods. Residual peptides are automatically collected and subjected to amino acid analysis in each operating cycle. There's also direct identification of the PTH on gas chromatograph or other instrument. Amino acid sequences are automatically analyzed.

Reagents are delivered automatically too, by a micro-quantity constant flow pump. It's a far better process than nitrogen pressure delivering systems. A variable rate mechanism accurately controls the stream. The data provided is highly reproducible and accurate.

Volatile buffer solutions such as triethylamine may be employed because of the unique design of reaction cup and chamber. A constantly rotating and climbing stream gives a high extraction efficiency. There's no contamination of fluids because the unique overflow system collects the extract from the reaction cup.

Both automatic and manual controls are provided in the 47K. A pre-programmed photoelectric tape can be selected in a minute, or the instrument can be operated with manual guidance. There are slide out drawers for full access to the interior of the instrument. Maintenance problems are no problem at all.

There's more to analyze in the amazing 47K. Our literature will do that job, it's available on request. Write The Automated Analyzer Division, JEOL, 235 Birchwood Ave., Cranford, N.J. 07016. Tel.: (201) 272-8820.


Booth L-119-120, FASEB, April 10-14

Circle No. 20 on Readers' Service Card
The Polytron® homogenizer.

If it can be done, we can probably do it.

The Willems Polytron® homogenizer is unlike any mixer you’ve ever used. It works on a unique principle—kinetic plus ultrasonic energy. And it often succeeds where other instruments fail.

Homogenization by sound waves means that tissues are broken down quickly to subcellular level without destruction of enzyme activity. You’d be hard-pressed to do that with other kinds of mixers.

In the applications field, the Polytron has proved so effective in inducing physical and chemical change that it has already revolutionized many procedures. Whether it be for dispersing, homogenizing, emulsifying or disrupting, a Polytron is available in the size to meet your specific requirements.

Contact us if you have any questions. Both literature and a demonstration are available on request.
BIOLOGY AND BIOCHEMISTRY STUDENTS, ECOLOGISTS, ENVIRONMENTAL BIOLOGISTS

If you are having a problem in penetrating and really understanding the thermodynamic background necessary for your work, here is a book that has been written especially for you.

ENTROPY FOR BIOLOGISTS

An Introduction to Thermodynamics

by HAROLD J. MOROWITZ, Department of Molecular Biophysics and Biochemistry, Yale University, New Haven, Connecticut

"... The final chapters discuss measurement in thermal physics and the place of entropy in biology. The global processes of the biosphere lead to the great ecological cycles. The entire process is exentropic owing to the flow of energy from the sun to outer space, but the local processes may lead to great order such as a rotifer, a sonnet, or the smile on the face of the Mona Lisa."

This quotation defines the flavor of the book, so different from the usual presentation of a physical chemist. Even the chapter exercises reveal the divergence. What would the graduate student in physical chemistry answer to the following problems: (a) a hen's egg in contact with an infinite isothermal reservoir gives rise to a chick. Discuss the entropy changes. (b) Why should the chirping rate of crickets be a poor parameter for an empirical thermometer?

In his preface the author stresses that this is not a 'how to' book; it is rather a 'what's it all about' book. He hopes that, after completing the volume the reader will have the self-assurance and tools to tackle the 'how to' books and apply thermodynamics to his own branch of biology. The reviewer believes that such expectations can be realized and congratulates the author for his effort."—HUGH TAYLOR, American Scientist, March-April, 1971

1970, 210 pp., $6.95 cloth, $4.95 paper

--

ACADEMIC PRESS
NEW YORK AND LONDON
111 FIFTH AVENUE, NEW YORK, N.Y. 10003

ATT. PROMOTION DEPARTMENT

Dear Sirs:

Please send me copies of ENTROPY FOR BIOLOGISTS at $6.95 (cloth) or $4.95 (paper). Please add applicable sales tax.

NAME ..................................................

AFFILIATION ......................................

ADDRESS .........................................

CITY/STATE/ZIP ...................................

Circle No. 51 on Readers' Service Card

925
The Sterilizable Pump with a Calibrated Muscle

This chemical feed diaphragm pump, with steam sterilizable head provides continuously adjustable flow rates up to 25 liters per hour. It meters acids, alkalis, solvents, biological media, viscous slurries, corrosives, gritty, granular materials and cell suspensions with an accuracy of ±2% over the entire range. The heavy duty pump can be sterilized directly thru the head cavity during operation, or the head can be removed for repeated autoclaving. Flip the switch to reverse flow, or to back flush for in-line sterilization.

FOR COMPLETE INFORMATION ASK FOR BULLETIN ... DF 415/272

NEW BRUNSWICK SCIENTIFIC CO., INC.
1130 Somerset Street, New Brunswick, N. J. 08903

Circle No. 91 on Readers' Service Card

CONSECUTIVE NUMBER LABELS

for test tubes, requisition forms, containers, control lots.

Easy-to-use, Time® Consecutive Number Labels are self-sticking — adhere to any surface in temperatures ranging from -70°F to +250°F. Numbers can be repeated from 1 to 10 times on a choice of seven different color stocks. Available in handy pre-cut tablet or clinically safe bacteriostatic roll form. Supplied with “No” prefix or your choice of 5 standard prefixes. Economical consecutive number labels increase lab efficiency.

FREE BROCHURE!
Write for samples, illustrated brochure, and the name of a dealer near you.

PROFESSIONAL TAPE COMPANY, INC.
144 TOWER DRIVE, BURRIDGE, ILLINOIS 60521

Circle No. 92 on Readers' Service Card

In the Forefront of Sociobiology
The First Comprehensive Study of Social Insects in Forty Years

Certain to become a landmark in the development of environmental and behavioral biology, this book is rich in the historical and theoretical aspects of the field. Including more than 250 illustrations, it covers the classification, evolution, anatomy, physiology, and behavior of the higher social insects — the ants, social wasps and bees, and termites. Mr. Wilson re-interprets here the knowledge on the subject through the concepts of modern biology, from biochemistry to evolutionary theory and population ecology. $20.00

"The study of social insects ... has now been developed to the point where many of the problems have become suitable for the attention of geneticists, physiologists, and biochemists. For specialists in these fields, ... Wilson's book will be an ideal source. For the entomologist it is inspiring reading as well as an important textbook." — O.W. Richards, Department of Zoology, Imperial College, London, in Science.

Circle No. 61 on Readers' Service Card

The Insect Societies
by Edward O. Wilson

The Belknap Press of Harvard University Press
Cambridge, Massachusetts 02138

25 FEBRUARY 1972


**New Journals Received**


---

**TWINcubator**

**Two Separately Controlled Environments in ONE Enclosure!**

... and these Outstanding Features

1. Choice of Plant Growth, Rearing and Incubator Models
2. Gradient-Free Horizontal Air Flow
3. Stainless Steel Interior
4. Plug-In Solid State Controls
5. Choice of Interchangeable Control Panels
6. Performance Engineered Humidity Control
7. Variety of Light Banks and Filters

---

Circle No. 63 on Readers’ Service Card

**SCIENCE, VOL. 175**