

Equipment

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science does not assume responsibility for the accuracy of the information. A coupon for use in making inquiries concerning the items listed appears on page 54.

■ **ROLLER-TUBE APPARATUS** for growing tissue cultures or viruses comprises a base-mounted motor driving a three-plate aluminum drum for rotating the culture tubes. A model with a drum 14 in. in diameter accommodates 164 tubes 16 mm or smaller. Over-all dimensions of this model are 16½ by 14 by 10½ in. Rotation rate is 1/5 rev/min. (New Brunswick Scientific Co., Dept. 549)

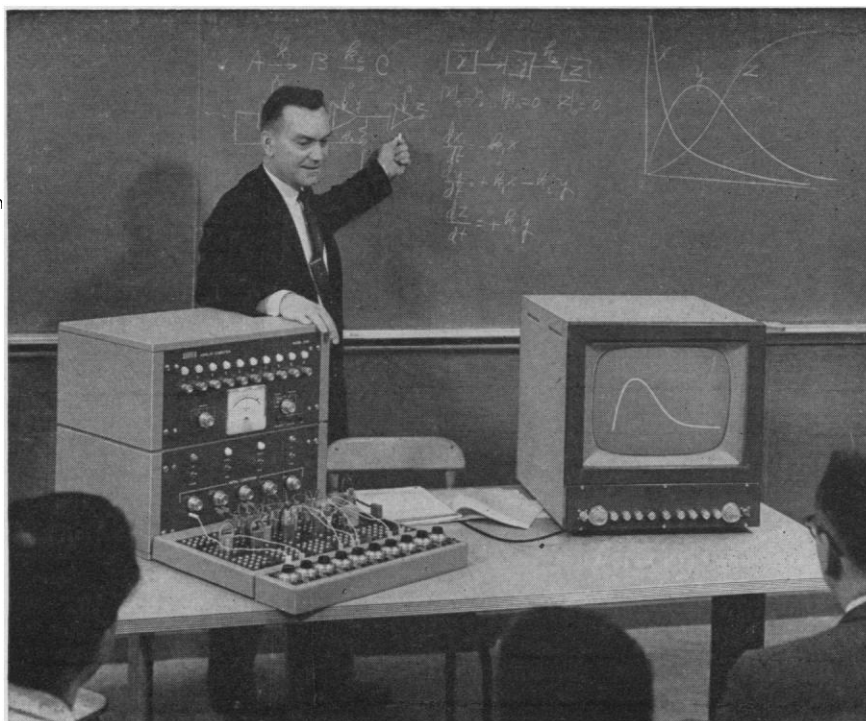
■ **AIR SAMPLER** operates from a 6-v battery to collect samples of dusts and radioactive aerosols. Air is sampled at a rate of 1 ft³/min through a high-efficiency filter. Flow rate is indicated by a flowmeter that is part of the sampler. (Gelman Instrument Co., Dept. 550)

■ **VARIABLE DIFFERENTIAL TRANSFORMER** provides output response linear within ±1 percent over a 2-in. displacement range. Maximum displacement output is 5.0 v into a 5500-ohm load for a nominal 6.3-v, 400-cy/sec input. Residual voltage at null position is less than 1.0 percent of maximum output. Nominal primary resistance is 260 ohms, and secondary resistance is 1500 ohms. Temperature range is -65° to +450°F. (Schaevitz Engineering, Dept. 555)

■ **MODULATION METER** measures percentage modulation of either a voltage or a frequency. A switch selects either function. The instrument is designed for a basic carrier of 400 cy/sec and has a modulation range 0 to 2 percent. Accuracy is ±5 percent of full scale, corresponding to 0.1 percent modulation. Modulation frequency response is 1 to 75 cy/sec. Cross-product effects are small. Other carrier frequencies can be provided. (Voltron Products, Dept. 557)

■ **ULTRAVIOLET MICROSCOPE ILLUMINATOR** provides radiation in the range 3600 to 4000 Å, with high intensity at 3650 to 3660 Å. The source uses a General Electric sealed-beam, reflector-type, high-pressure mercury spotlight. A filter removes more than 90 percent of the visible light. The illuminator is provided with a transformer and is mounted on the microscope. (Burton Manufacturing Co., Dept. 559)

■ **INFRARED SPECTROPHOTOMETER** uses a potassium bromide prism for dispersion to cover the 12.5- to 25-μ region. The instrument incorporates design and operating features of previous models with



Using the Donner 3000 to display rate equations of chemical kinetics.

On the right hand side of the blackboard are simultaneous equations representing typical consecutive reactions in the complex parent-daughter relationships of radiochemistry. Set up according to the corresponding computer programming schematics on the left, the Donner 3000 solves the equations for arbitrary choice of parameters, and displays the results graphically on an oscilloscope or recorder. An important example of this three-component problem is the decay of Zirconium⁹⁵ and its daughter Columbium⁹⁵ to Molybdenum⁹⁵ as the stable end product..

"Teaching Assistant"

MODEL 3000

There's a new way to multiply effectiveness in the teaching of science—without multiplying the teaching load. The Donner Model 3000 Analog Computer serves as a veritable "Teaching Assistant," recreating the dynamic behavior of an arbitrary physical system from the describing differential equations. Its behavior is quantitative, its presentation is visual, its impact on the student is powerful and lasting.

A Donner analog computer can take responsibility in your classroom for faithful display of dynamic phenomena, from the simulation of nerve action to the solution of differential equations of pure mathematics. Without detailed knowledge of analog computers you can use the Model 3000 to solve and display problems in such fields as:

antenna design • medical research • cybernetics • electron trajectories • nuclear reactor design • fluid mechanics • heat transfer analysis • aerodynamics • meteorology • classical and nuclear physics • chemical kinetics • petroleum engineering • servo system analysis • auto- and cross-correlation • economic forecasting.

Donner has pioneered in the introduction of electronic analog computers to the lecture room and the laboratory. For just over \$1000 you can put the Donner Model 3000 to work in your classroom. A letter outlining your specific areas of interest addressed to Dr. V. B. Corey, Technical Director, Donner Scientific Company, Concord, California, will bring full details.

SCIENTISTS and ENGINEERS

Dynamic new subsidiary of **Ford Motor Company** is now in initial stages of expanding military and commercial programs.

Positions are at ASI's interim Glendale facility and will also be at ASI's new Research Center now under construction at Newport Beach in Southern California. Work in an intellectual environment as stimulating as the locations are ideal—close to most of So. California's cultural, educational, and recreational centers.

Outstanding growth opportunities for qualified engineers and scientists who are U.S. citizens are open in following fields:

OFFICE OF ADVANCED RESEARCH—THEORETICAL RESEARCH—Hydrodynamic and radiation processes in tenuous gases at very high temperatures, ionization produced by soft X-radiation, hydrodynamics of solids at high pressures including studies of equations of state, infrared properties of the atmosphere and of hot gases, conversion of chemical energy into sound and the condensation rate of supersaturated vapors. Theoretical physicists are needed to work in these fields. Specific experience is not necessary. However, a general background in theoretical and mathematical physics is required.

You are invited to address inquiries to **M. H. Johnson, Advanced Research Staff at our Glendale, California address.**

Other unusual opportunities are open for qualified engineers and scientists in the following areas:

SPACE TECHNOLOGY DIVISION

Astrodynamics • Space Environment • Theoretical Physics • Electronics • Radar • Information Links • Automatic Controls • Mathematics

COMPUTER DIVISION

Input-Output Equipment Storage Units • Display Devices

TACTICAL WEAPON SYSTEMS DIVISION

• Aerodynamics
• Electro-optics
• Guidance and control

Qualified applicants for the above three divisions are invited to send resumes and inquiries to **Mr. K. A. Dunn, 1234 Air Way, Bldg. 16, Glendale, California. Phone CHapman 5-6651.**

AERONUTRONIC SYSTEMS, INC.

a subsidiary of
FORD MOTOR COMPANY
NEWPORT BEACH, GLENDALE,
SANTA ANA AND MAYWOOD, CALIF.

NaCl prisms except for new wavelength and slit cams and a new monochromator window that serves also as a scattered-light filter. Scanning time is 6.5 min. Abscissa accuracy is ± 1 percent. Scattered light is less than 5 percent at 24.5 μ , decreasing to less than 1 percent for shorter wavelengths. (Perkin-Elmer Corporation, Dept. 561)

■ **DIELECTRIC MEASURING LINE** permits direct measurement of dielectric constant and dissipation factor, in the 200 to 5000 Mc/sec range, of low-loss solid insulating materials. The instrument is a slotted line designed to accommodate cylindrical samples up to 45 cm long. Measurements of dielectric constant between 1 and 10 and of dissipation factor between 0.0001 and 0.05 can be made with accuracies of ± 2 percent and ± 5 percent $+0.0001$, respectively, over the range cited. (General Radio Co., Dept. 564)

■ **TEFLON DISPERSIONS** for coating application can be cured at temperature of 300°F or less. The dispersion is mixed with a binder for application with a spray gun. A dispersion in a phenolic

binder cures in 1 hour at 300°F. An air-drying dispersion is available for more heat-sensitive substrates. (Acheson Colloids Co., Dept. 565)

■ **PLANT-GROWTH CHAMBERS** are available in two sizes: 50 by 26 by 38 in. and 86 by 50 by 54 in. Temperature is regulated by adjustable day and night thermostats selected by a photoperiod time clock. Maximum light intensity is 2000 ft-ca. Temperature range is 50° to 100°F with lights on and 48° to 100°F with lights off in 90°F ambient air. The plant bed is raised and lowered by cables and winch. (National Appliance Co., Dept. 562)

■ **SAMPLING SWITCH** is comprised of three poles with 30 contacts per pole operating at 5 rev/sec. Two of the poles are designed to scan differential-thermocouple and strain-gage signals, while the third pole provides the timing function. Noise levels are in the order of 20 to 30 μ v throughout the 1000-hr operating life. (Instrument Development Laboratories, Dept. 574)

JOSHUA STERN
National Bureau of Standards

PERSONNEL PLACEMENT

POSITIONS OPEN

AUSTRALIA—UNIVERSITY OF MELBOURNE SENIOR LECTURER or LECTURER IN ZOOLOGY

Applications are invited for the above position.

Applicants should be physiologists with special interests in either general or cellular physiology.

The salary ranges are £A2100 to £2500 per annum for senior lecturers and £A1450 to £2100 per annum for lecturers. Initial salary will be determined according to qualifications and experience. Superannuation similar to F.S.S.U. in Great Britain will be provided.

Conditions of appointment may be obtained from the Secretary, Association of universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close, in Melbourne and London, on 31 January 1959. X

Biologists, Ph.D.'s, new state college, southern California. Prefer background in physiology, genetics, embryology, microbiology, or botany. Please send full résumé to Ralph Prator, President, San Fernando Valley State College, Northridge, California. 1/9, 16, 23

Immunochemist, or Biochemist interested in field of infectious diseases. Activities include studies on immune mechanisms and on the biochemistry of virus infections. Full-time research position. Salary open; minimal \$8000. Apply H. A. Wenner, M.D., Section for Virus Research, University of Kansas School of Medicine, Kansas City, Kansas. 1/2

LOBUND INSTITUTE University of Notre Dame

Letters of application are invited for positions on long range research projects at Lobund. Research laboratories within the Institute, which conducts a variety of programs with germ-free animals, include bacteriology, biochemistry, serology, physiology, virology, oncology, and immunology. Opportunities are available immediately due to expanding operations on three levels:

Research Technician
Senior Technician
Junior Technician

Positions require a wide range of qualifications from M.S. in bacteriology or biochemistry through B.S. to college training with experience in laboratory procedures. Direct inquiries to Personnel Director, University of Notre Dame, Notre Dame, Indiana. 1/2

CLASSIFIED: 25¢ per word, minimum charge \$4.25. Use of Box Number counts as 10 additional words. Payment in advance is required.

COPY for classified ads must reach SCIENCE 2 weeks before date of issue (Friday of every week).

DISPLAY: Rates listed below—no charge for Box number. Monthly invoices will be sent on a charge account basis—provided that satisfactory credit is established.

Single insertion	\$26.00 per inch
13 times in 1 year	\$24.00 per inch
26 times in 1 year	\$23.00 per inch
52 times in 1 year	\$22.00 per inch

For **PROOFS** on display ads, copy must reach SCIENCE 4 weeks before date of issue (Friday of every week).

Replies to blind ads should be addressed as follows:

Box (give number)
Science
1515 Massachusetts Ave., NW
Washington 5, D.C.

POSITIONS WANTED

Botanist-Plant Physiologist, strong horticultural experience, available summer 1959. Cornell Ph.D., publications, research-administrative experience, age 40. Box 1, SCIENCE. 1/16

Physiologist-Biochemist, Ph.D.; 8 years of industrial and academic research experience in fields of endocrinology, enzymology, carbohydrate and lipid metabolism. Desires challenging research position. Publications. Box 2, SCIENCE. 1/16

Scientist, B.S. in agriculture; interested in assignment involving product or quality control; 11 years on staff of major pharmaceutical company, 4 years, supervisor penicillin extraction, 6 years, bacteriology and quality control. Medical Bureau, Burnside Larson, Director, 900 North Michigan, Chicago. X

Technical Librarian-Information Specialist. Ph.D. biological sciences, M.A. library science; 3 years experience, head department of large university library, head divisional library of large well-known industrial firm. Box 4, SCIENCE. X

ЖУРНАЛИ БИОЛОГИИ

ENGLISH TRANSLATIONS OF RUSSIAN BIOLOGICAL JOURNALS

The American Institute of Biological Sciences, under a grant from the National Science Foundation, is currently translating and publishing seven Russian research journals in biology.

DOKLADY: BIOLOGICAL SCIENCES SECTION

6 issues per year. Subscriptions: \$20.00 per year, U.S.A. & Canada
22.50 per year, foreign
4.00 each, single copies

DOKLADY: BOTANICAL SCIENCES SECTION

6 issues per year. Subscriptions: \$ 7.50 per year, U.S.A. & Canada
9.00 per year, foreign
1.50 each, single copies

DOKLADY: BIOCHEMISTRY SECTION

6 issues per year. Subscriptions: \$15.00 per year, individuals and industrial libraries
10.00 per year, university and non-profit libraries
3.00 additional to each price, foreign
4.50 each, single copies

MICROBIOLOGY • MICROBIOLOGIYA

6 issues per year. Subscriptions: \$20.00 per year, U.S.A. & Canada
22.50 per year, foreign
4.00 each, single copies

PLANT PHYSIOLOGY • FIZIOLOGIYA RASTENY

6 issues per year. Subscriptions: \$14.00 per year, U.S.A. & Canada
17.00 per year, foreign
3.00 each, single copies

ENTOMOLOGICAL REVIEW • ENTOMOLOGICHESKOE OBOZRENIE

4 issues per year. Subscriptions: \$25.00 per year, individuals and industrial libraries
12.00 per year, university and non-profit libraries
3.00 additional to each price, foreign
7.50 each, single copies

SOIL SCIENCE • POCHVOVEDENIYE

12 issues per year. Subscriptions: \$40.00 per year, individuals and industrial libraries
20.00 per year, university and non-profit libraries
3.00 additional to each price, foreign
7.50 each, single copies

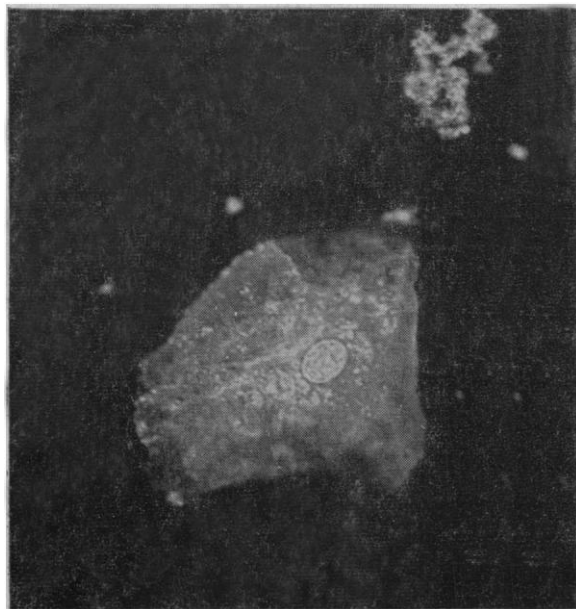
All orders and subscriptions should be placed with

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

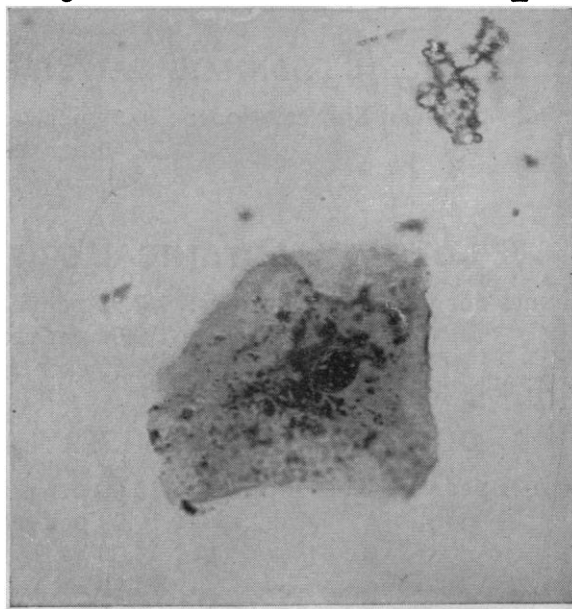
2000 P. St., N.W.

Washington 6, D.C.

Here's how you can MEASURE OPTICAL PATH DIFFERENCE with the AO-Baker Interference Microscope



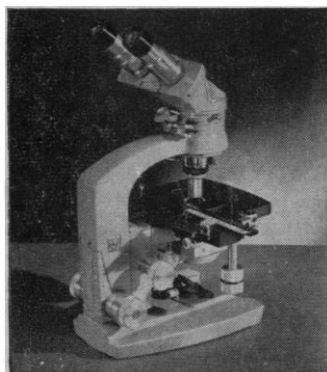
1. First, as shown in the photomicrograph* above, the microscope analyzer was rotated until the background was brought to extinction. Readings were taken directly from the analyzer scale. Averaged settings resulted in reading of 70.4°.



2. Next, the analyzer was rotated until the nucleus of the cell was brought to extinction. Averaged settings resulted in reading of 138.2°.

3. The Optical Path Difference, in degrees, is *twice* the difference between the two readings:

$$OPD = 2 (138.2^\circ - 70.4^\circ) = 135.6^\circ, \text{ or } OPD = \left(\frac{135.6^\circ}{360^\circ} \right) .546 = .206 \text{ Microns.}$$



Optical path difference measurements can be made to an optimum accuracy of 1/300 wavelength. This unique ability to measure optical path thicknesses is in itself of great importance. But even more important, these measurements can be converted into a variety of quantitative information of great potential value. Water and protein content of a cell, for example, may be measured. Materials such as glass, plastics, emulsions, textiles can be examined.

While the AO-Baker Interference Microscope is primarily a quantitative instrument, it also offers unique advantages for qualitative observations through variable intensity contrast and dramatically effective variable color contrast.

*Photomicrographs taken by Mr. Lynn C. Wall, Medical Division, Eastman Kodak Co. Data: Epithelial Cell.
AO-Baker Interference Microscope, 40X Shearing objective, 10X eyepieces. Corning filter CS4-120 with AO Model 630 Pulsarc Illuminator to transmit monochromatic light at .546 microns.

WRITE FOR COMPLETE INFORMATION



Dept. M-1

Please Send me your NEW COLOR BROCHURE SB7 on the
AO-BAKER INTERFERENCE MICROSCOPE.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____