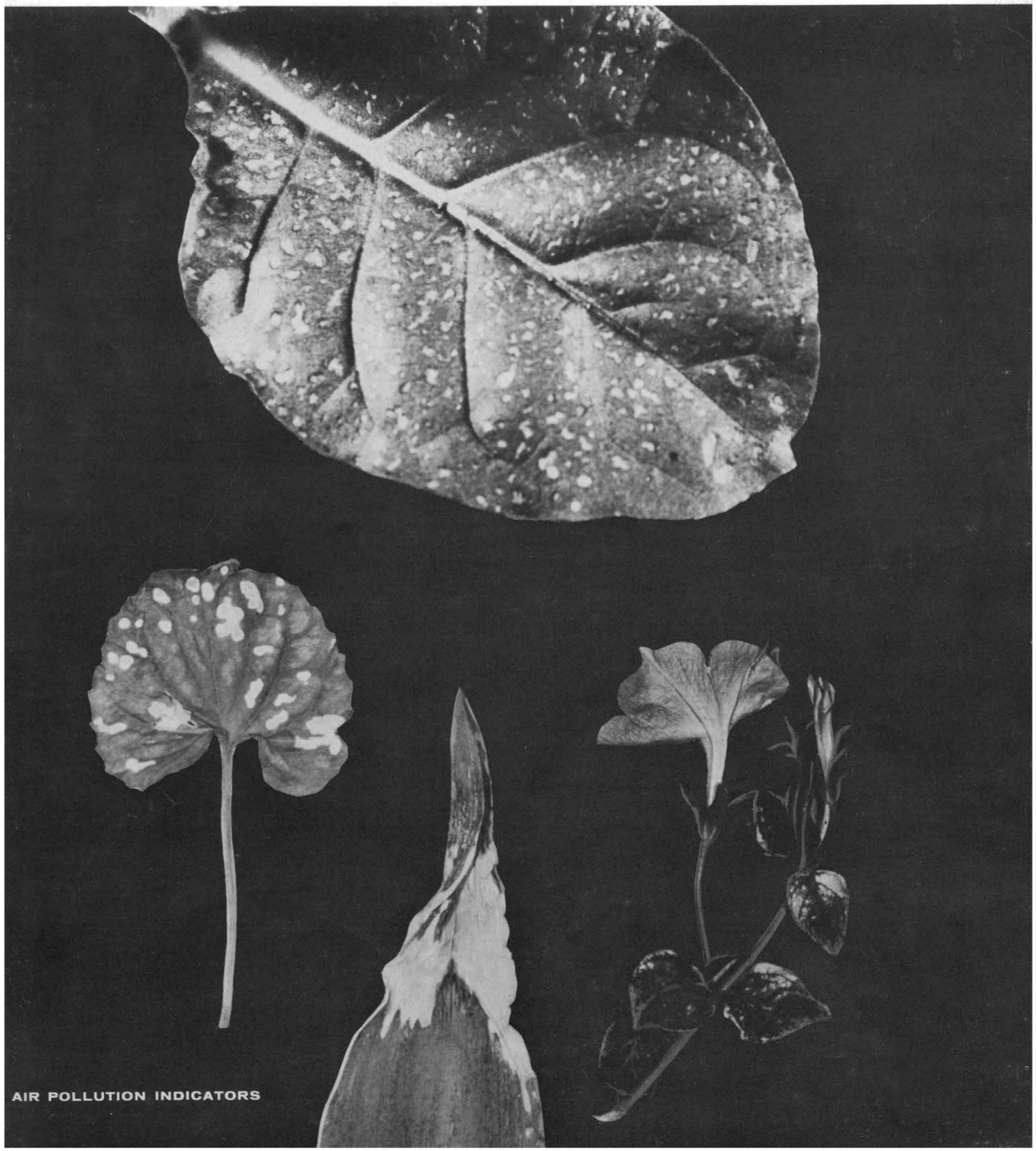
SCIENCE

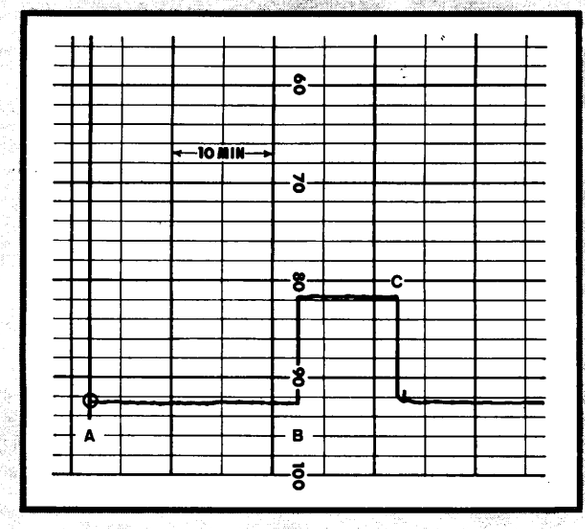
4 March 1966

Vol. 151, No. 3714

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

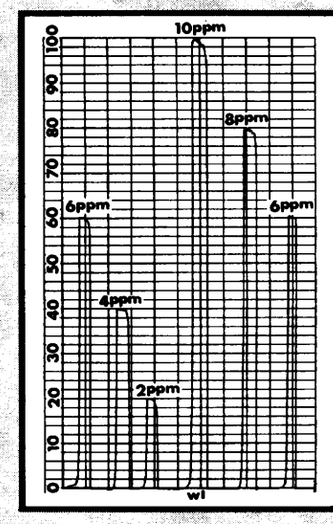


AIR POLLUTION INDICATORS



Model 303 double-beam system eliminates the effects of drift in lamp, detector, and electronics. Here, Ca is run from a cold start. Burner is lighted at A, 1 ppm Ca inserted at B, withdrawn at C. Quiet, stable baseline commonly produces 5X improvement in detection limit and precision.

Model 290 readout in concentration requires no tedious calculations. Here, direct readings on an accessory linear recorder are obtained for 2, 4, 6, 8, and 10 ppm Calcium.



performance-proved instruments for ATOMIC ABSORPTION ANALYSIS

WHY YOU SHOULD USE PERKIN-ELMER ATOMIC ABSORPTION

Atomic absorption for the determination of metallic elements is today's fastest-growing analytical technique. Perkin-Elmer, a leader from the beginning, has the kind of competence that produced its Analytical Methods Book, which gives detailed guidance for 64 elements and over 300 analyses. Perkin-Elmer also publishes the Atomic Absorption Newsletter, the only technical journal devoted to the new technique.

Clearly, such deep analytical experience can result in first-class atomic absorption equipment. Indeed, Perkin-Elmer's two instruments are designed expressly for the special needs of atomic absorption: they are not compromises, accessories, or adaptations of equipment originally developed for other needs.

The Model 303 double-beam system offers speed, precision and sensitivity: With built-in 10X scale expansion, it is possible to detect very small deviations from the stable baseline shown above, left. The ability to measure tiny signals produces the best possible detection limits.

With the DCR-1 accessory, the Model 303 reads out directly in concentration in any desired units on a four-digit illuminated display. A determination can be completed in four seconds. The DCR-1 will also automatically take and present the average of 4, 8, or 16 readings of the same sample.

The Model 290 Reads Directly in Concentration: The most time-consuming portion of conventional atomic absorption analysis is the conversion of linear transmittance readings to their logarithms, followed by curve plotting. With the 290, all this is eliminated. The 5-inch readout scale is linear in concentration.

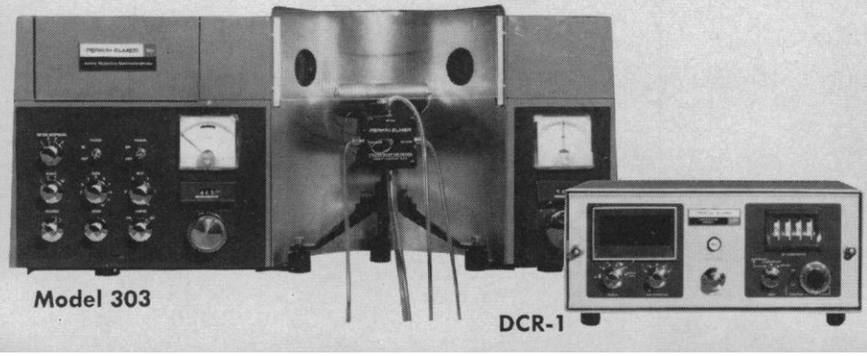
The Model 290 is a big instrument in a small container. A 50-inch optical path has been folded into a neat 25-inch package; detection limits are therefore equal to or better than those of much larger single-beam instruments. And the price for the complete instrument is only $2900.

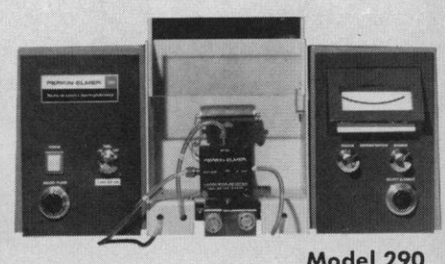
Both instruments can determine over 60 elements with Perkin-Elmer-built single and multi-element hollow-cathode lamps and the versatile premix burner. The nitrous oxide burner head enables analysis for Al, Ti, V, Si, the rare earths and other refractory elements. The new three-slot Boling head, for air-acetylene, does not clog with solutions containing 40% sugar, 20% lead, or undiluted serum. Yet another head provides a short optical path to reduce sensitivity and avoid dilutions.

Free training and literature: Subscriptions to the Atomic Absorption Newsletter, a bi-monthly technical journal, are available free on request. A summary of applications reprints can be obtained by writing for AA322. Instrument users receive free training courses in Chicago, Houston, Los Angeles, San Francisco, or Norwalk, Connecticut.

For details, including information on specific applications, write to the Instrument Division, Perkin-Elmer Corporation, **723** Main Avenue, Norwalk, Connecticut.

PERKIN-ELMER





Is ersatz ever better?

(Or: is it excessively presumptuous to claim—as we do herein—that our new reconstituted C^{14} protein hydrolysate is always all ways better for protein labeling than a natural C^{14}protein hydrolysate?)

The problem with using a natural yeast or algal C^{14} protein hydrolysate for protein labeling is that you *start* your work with numerous and varied unneeded unknowns since the natural hydrolysate is relatively crude and may contain as much as 30-40% of non-amino acid material. And who needs such gratuitous complications?

The uncertainty that comes from undefined and unwanted contaminants can now be avoided by using our new reconstituted C^{14} protein hydrolysate which consists of C^{14} amino acids (and C^{14} amino acids *only*.) This product is exclusive with us. At least for the nonce.

Our work gets started (as *yours* shouldn't) with the typically unpredictable C^{14} yeast hydrolysate. But its amino acids are then separated and purified and the extraneous materials eliminated. At this point we have the individual amino acids, each with a *minimum* radiochemical purity of 99%. Thirteen of these are then recombined so as to mimic closely their proportions in the natural hydrolysate.

Two things can now be said about this reconstituted protein hydrolysate: (1) it has a 100% biosynthetically-prepared L-amino acid composition, and (2) all of the amino acids are uniformly C^{14} labeled. Or, more simply: this mixture is free of any non-amino acid material, hot or cold, and all of the amino acids are hot.

If you reached this point assuming that the extra processing, the extra purity, the extra convenience to you, is going to *cost* you extra—forget it. It won't. Rather surprisingly, 100 μc of this C^{14} reconstituted protein hydrolysate costs only $35. 500 μc is $170. 1 mc runs $320. And 2 mc a mere $600. (For a pleasant surprise, compare these prices with what you now pay for the crude natural product.) Also, please note that you get a Product Analysis Report with every shipment with the specific activity of each of the component amino acids. The other specifications for this product look like this:

	sp. act. mc/mmole	μc/mc of mix.		sp. act. mc/mmole	μc/mc of mix.
L-Ala-C^{14}	> 70	80	L-Phe-C^{14}	>168	80
L-Arg-C^{14}	>130	50	L-Pro-C^{14}	>110	50
L-Asp-C^{14}	>110	125	L-Ser-C^{14}	> 85	80
L-Glu-C^{14}	>165	125	L-Thr-C^{14}	>100	80
L-Ileu-C^{14}	>110	100	L-Tyr-C^{14}	>150	80
L-Leu-C^{14}	>130	50	L-Val-C^{14}	>100	50
L-Lys-C^{14}	>180	50			

mixture of purified L-amino acids is in 0.01 *N* HCl/ 100 μc vials contain 100 μc/ml / all other vials contain 1 mc/ml

One interesting final point: we also have a mixture that is comparable in essentially every respect to the reconstituted protein hydrolysate shown above but with only these four C^{14} essential amino acids: arginine, leucine, lysine, valine, and with total activity divided equally among these. This too is new. We call it our C^{14} L-Amino Acid Protein Labeling Mixture (catalog no. 3122-06). It, and the reconstituted protein hydrolysate (catalog no. 3122-08), are immediately available to you from stock. Write, or call us collect at 914-359-2700. Ask for Maryann.

Schwarz BioResearch, Inc.
ORANGEBURG, NEW YORK 10962

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SCIENCE

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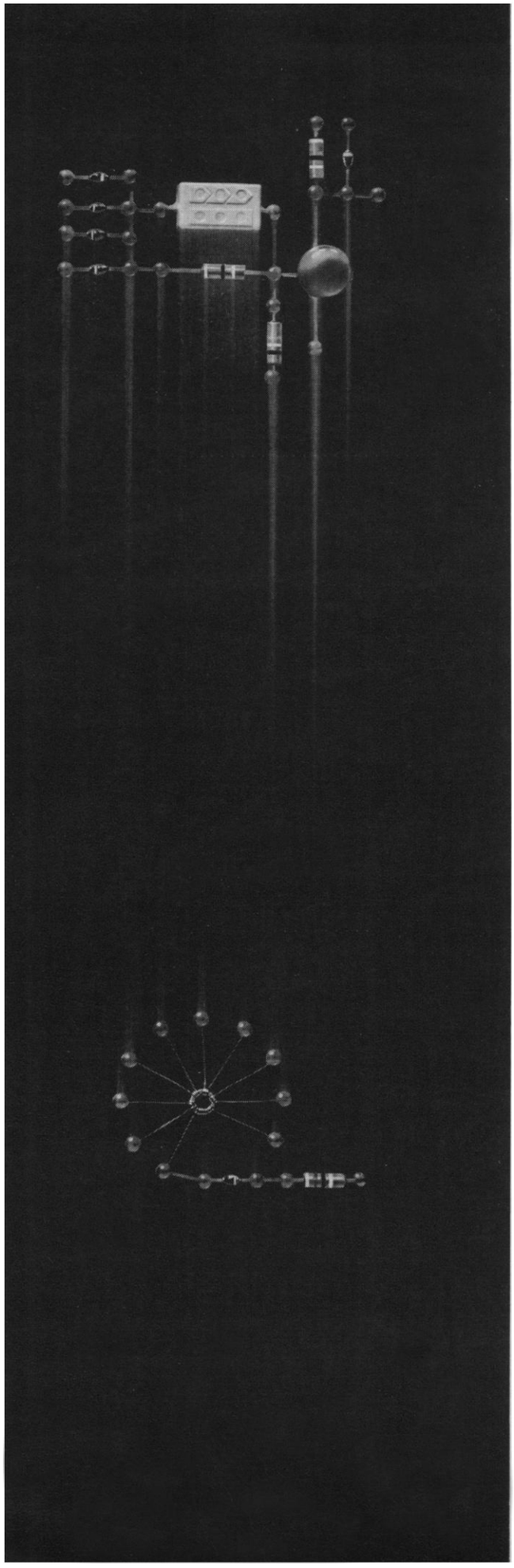
COVER

Certain plants are sensitive to specific atmospheric pollutants and can be used as "indicators" of contamination. (Clockwise from the top) Tobacco fleck indicates the presence of ozone; banding on the snowstorm petunia is indicative of aldehydes; terminal and marginal scorching of tulip leaves denotes the presence of gaseous fluorides; and intercostal markings on the violet indicate sulfur dioxide. See page 1105. [Robert H. Daines, Ida A. Leone, and Eileen Brennan, Rutgers University, New Brunswick, New Jersey]



One of a series briefly describing GM's research in depth

a logic circuit that shrank from improvement

In an age of persistently expanding technological complexity, we've used a different approach to sophisticated electronics.

Simplicity.

Our simplified magnetic logic system uses a magnetic core to compare and store its information. It makes decisions, then responds.

We've told here before about fundamental studies of ferromagnetism itself, and about development of square loop ferrites. Now we've developed techniques, components, and circuitry for improved magnetic logic.

A ferrite memory core, a silicon diode, and a resistor combine into a logic module. Put modules together and you can build complete control circuits. Add to these the simple driver circuits we've engineered—to provide the needed input pulses—and the output stage to feed continuous control information to a machine.

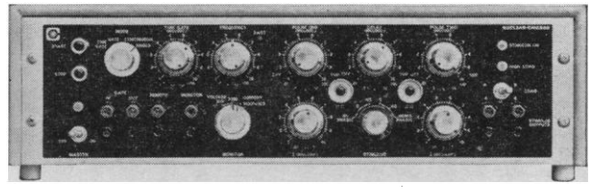
True, all-semiconductor logic circuits can do this same job. And they can act much faster than magnetic circuits. But sometimes you don't need all that speed. This magnetic circuit will handle up to 50,000 information pulses per second. And it needs only one-half to one-fifth as many parts.

Its cost approaches that of a relay logic system. It has low impedance, too—10 ohms in the core circuit—providing a high immunity to electrical noise.

These systems aren't out of the laboratory yet. But we think they have a great future.

GM General Motors Research Laboratories
Warren, Michigan 48090

This new stimulator extends the scope and enhances the precision of evoked-response studies



Nuclear-Chicago's Model 7150 Constant-Current Stimulator offers a variety of operating benefits not found in other stimulators.

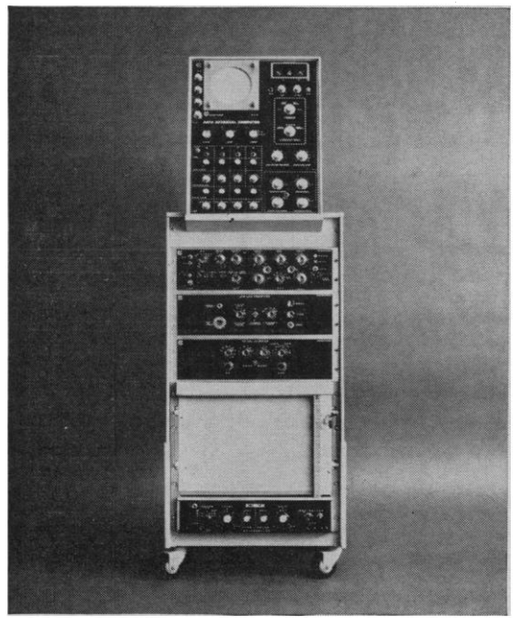
One unprecedented benefit of this fully transistorized stimulator is its constant, current-regulated output, which is independent of wide variations in load impedance.

Equally significant is the Model 7150 Stimulator's ability to produce both symmetrical and nonsymmetrical biphasic or monophasic pulse pairs. Its unique symmetrical biphasic output gives a waveform with an average DC value of zero—a marked advantage in brain stimulation studies where tissue damage must be avoided.

In the nonsymmetrical mode, the amplitude and width of each pulse and the time delay between the two pulses are independently variable.

A further superiority of the Model 7150 Stimulator is the complete isolation of its output from AC power and ground as well as from the built-in voltage and current monitor. As a result, stray currents and other undesirable side effects from instruments having a ground return are eliminated.

Operating convenience features of the Model 7150 include: a self-contained, timed gate that can be triggered remotely to adjust the duration of stimulator output; dual output connectors for switching of stimuli between subjects; a neon stimulus-output indicator; and warning indicators for both pulse overlap and excessive load-impedance. NUC-Q-4-265



The advanced design of the Model 7150 Constant-Current Stimulator makes it a valuable component of Nuclear-Chicago's Data Retrieval Computer (DRC) System. The heart of this comprehensive system for the "on-line" averaging and analysis of bioelectric signals is the Model 7100 Data Retrieval Computer. A typical DRC System is shown at left. Its components are (top to bottom): the Data Retrieval Computer, constant-current stimulator, AC differential preamplifier, voltage calibrator, and X-Y point-plot recorder.

Contact your Nuclear-Chicago sales engineer or write us for full details.

NUCLEAR-CHICAGO
A DIVISION OF NUCLEAR-CHICAGO CORPORATION
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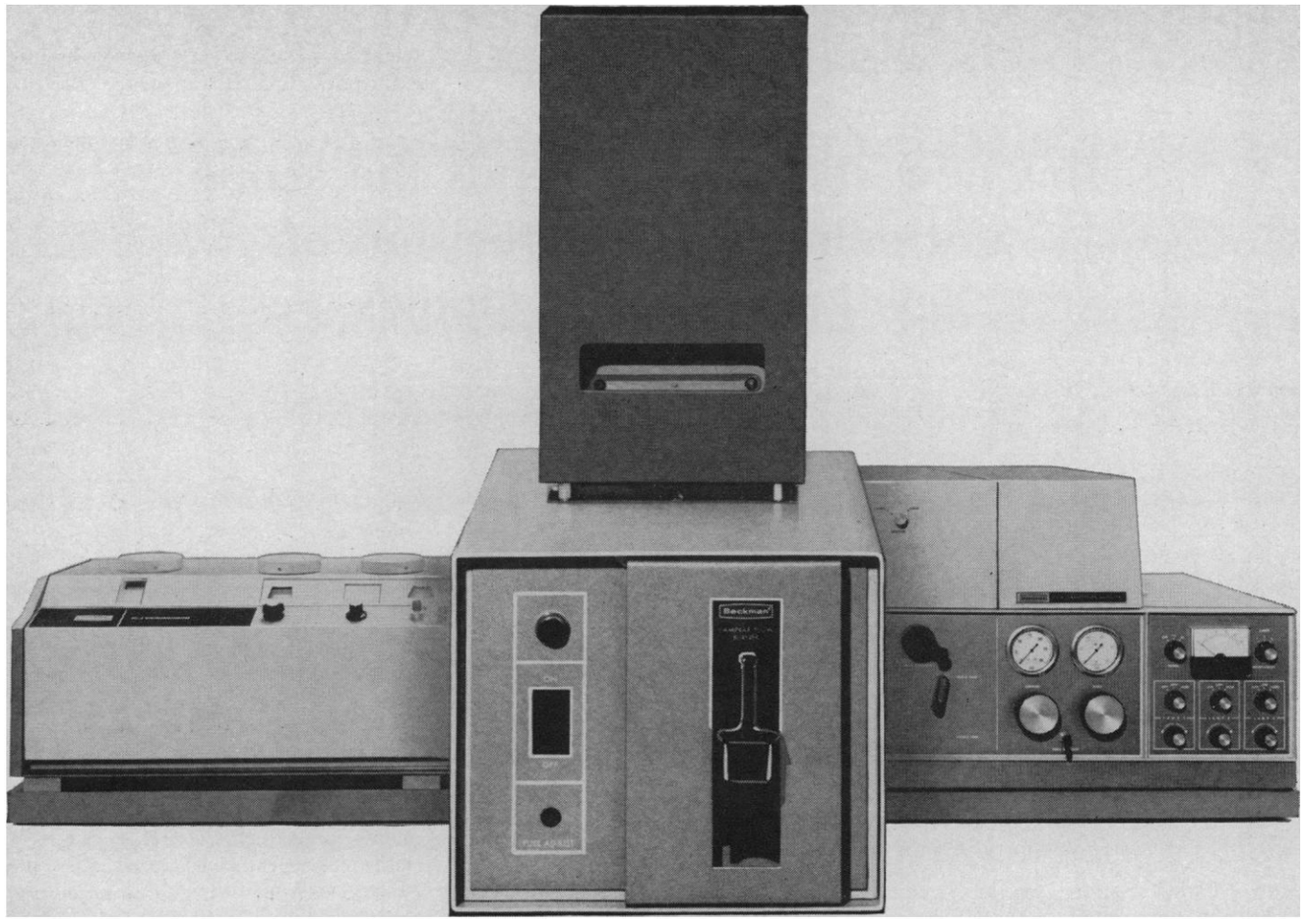
Scientists and engineers interested in challenging career opportunities are invited to contact our personnel director.



Extend sensitivity six-fold with the most advanced burner in atomic absorption.

It's the new Laminar Flow Burner* on the Beckman Atomic Absorption Accessory. A marked advance in burner design, it increases sensitivity of most analyses six-, ten-, fifteen-fold or more by eliminating the solvent and concentrating the sample before it reaches the flame. Thus, only solid sample is burned... no solvent dilutes it... no solvent cools the flame. With the Beckman Atomic Absorption Accessory, analysis is simple, specific, and highly sensitive... permitting analysis of trace quantities of a great many metals in the parts per billion range... in a variety of applications.

The Atomic Absorption Accessory is designed for use with the Beckman DU®, DU-2, DB®, or DB-G Ultraviolet Spectrophotometer. Add the accessory to the spectrophotometer you already have, and get atomic absorption capability for one-half the cost of most single-purpose atomic absorption instruments. Or buy a new spectrophotometer and accessory for the same cost as most single-purpose instruments. The Beckman system allows you to perform atomic absorption analyses, emission flame photometry, *and* ultraviolet spectrophotometry. Change-over from one type of analysis to another is rapid and easy.

For more information on the Atomic Absorption Accessory, contact your local Beckman Sales Engineer or write for Data File LUV-266.

*PATENT PENDING

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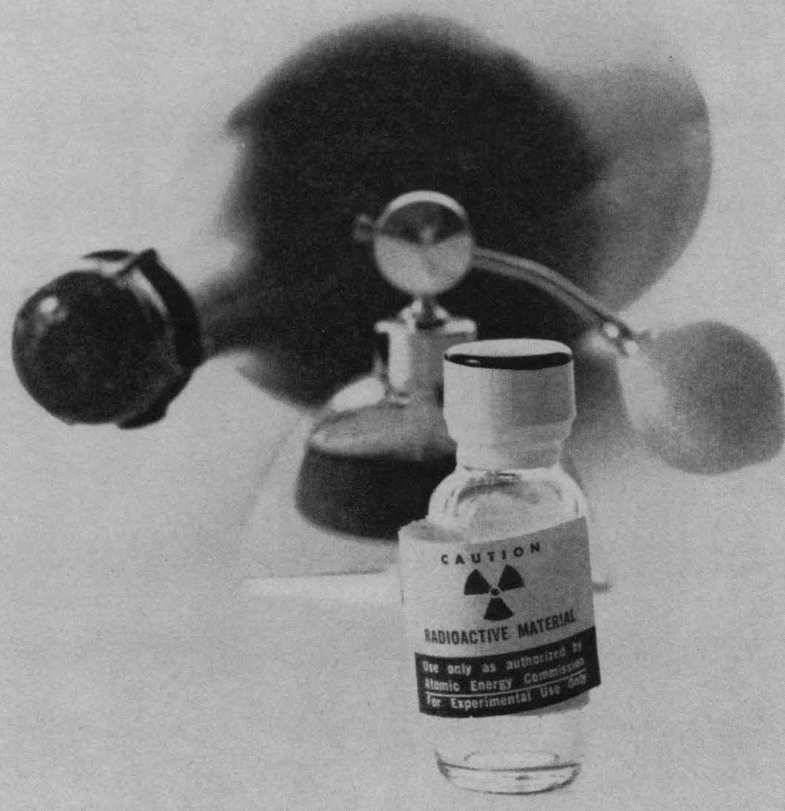

Il y a des choses que nous achetons en France.

Twenty radioactive compounds in our catalog begin with the prefix CMM. That nomenclature means — we don't make them ourselves. We buy them (in France) for the convenience of our users. We check them out. We test them. We guarantee their purity. But, we don't make them. The point is, 749 radioactive compounds in our catalog are not marked that way. Guess what that means.

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mation should be carefully spelled out. What information might lead to the selection of option A? What combination of facts would give us confidence that option B was better? Is there any conceivable set of facts that would lead us to choose option C?

4) Those seeking information should first make their own searches for data. A very large proportion of the information for which we are routinely asked has already appeared in published form.

5) Accurate methods of acquiring the missing facts should be devised with the help of competent social scientists. For example, account should be taken from the beginning of possible distortions in the data resulting from incomplete returns. Plans should be made to deal with alternative patterns of response.

6) Only those questions should be included in the survey whose answers have specific and definable bearing on the making of a decision which is itself of significance. (These questions include, of course, those which will define the respondent and enable his data to be suitably classified, but the classifications should themselves be limited to those of known importance.)

7) The specific usefulness of individual items of information should be clarified for the respondent. If the college president or dean sees no relevance to your question about the number of laboratory assistants or faculty secretaries, he is unlikely to count them for you.

8) Institutions, individuals, and associations should place less reliance on "survey experts." Commercial survey organizations have been responsible for many of the worst examples that we see, including some of those cited.

W. C. H. PRENTICE
Wheaton College,
Norton, Massachusetts 02766

Energy: Release, Not Increase

David H. Fuller writes (Letters, 19 Nov. 1965), "A quite common factor in achievement in all fields is energy level—not motivation or drive or push but the physical energy a person has available to follow his motivation." He wonders about the man who could find a way of increasing this energy.

When iproniazid, the first monoamine oxidase inhibitor and antidepressive drug, came into use, N. S. Kline termed drugs of this type "psychic energizers," believing that psychic energy could be increased by administration of the drug. This turned out to be a wrong assumption.

That we shall be able to truly increase the innate energy or intelligence of man seems unlikely. What we can do, however, is to free the psychic energy that is bound by inner conflicts and emotional turmoil. Thus we can add to the available energy and ability to think.

It is estimated that most people use only 50 percent of their potential energy and ability; psychiatrists and educators, to mention just a few, are active "achievers" in improving this situation.

ALFRED DENZEL
Psychiatrisches Landeskrankenhaus,
7102 Weinsberg/Württemberg,
Germany

Metric System in Optics

The optician's attention should be drawn to the advantages of the metric system, which is coherent, logical, and internationally accepted. The problem of "inconveniently large numbers" cited by G. Wald in his letter on the plotting of spectra (3 Dec., p. 1239) is easily avoided in the metric system by the use of prefixes. The obsolete "micron" and "millimicron" are, correctly, the micrometer and the nanometer, respectively, abbreviated μm and nm.

The metric unit of frequency is the cycle per second, or hertz. For electromagnetic radiation, 1 m = 300 megahertz, and 1 μm = 300 terahertz, approximately. If the opticians will invent suitable prefixes for 10^{15}, 10^{18}, and 10^{21}, all frequencies of interest at present (from the megahertz waves from space up to the highest frequency cosmic) will be conveniently describable.

Wald is perfectly correct that it will take a long time to change over. He is also correct in saying that change is long overdue. It took the electronic engineers 25 years to accept the prefix "pico" (10^{-12}). The recently coined "femto" (10^{-15}) and "atto" (10^{-18}) now await acceptance.

The metric prefixes are tabulated on page F85 of the 1965–1966 *Handbook of Chemistry and Physics*—and elsewhere.

F. P. HUGHES
318 Pim Street, Sault Ste. Marie,
Ontario, Canada

Combine the rapidity and sensitivity of TLC with the convenience of paper chromatography

A collection of separation procedures has now been published for the EASTMAN CHROMAGRAM System, the one that makes thin-layer chromatography convenient, economical, and mess-free. These are typical:

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dibasic acids
glycerides
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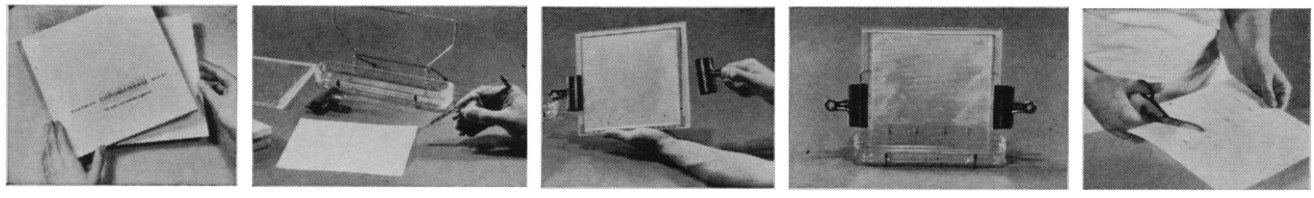
serum lipids
2,4-dinitrophenylhydrazones
fat-soluble vitamins
tocopherols
cholesterol and cholesterol esters
pesticides
antioxidants
some common dyes
photographic developing agents
ball-point inks

More analytical procedures are in the works, and we'll send them to you as they become available.



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Patents applied for. "CHROMAGRAM" is a trademark.

Distillation Products Industries is a division of Eastman Kodak Company

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Homi Bhabha and the Underdeveloped Nations

No thoughtful person can take the plight of the less-developed countries casually. Quite apart from the sympathy the humane individual may have for those who live under deprivation and hardship, it is a simple fact that no relatively advanced society can be free to fulfill its own destiny as long as widespread misery exists on our globe. Our own country in particular, which is looked to for help and leadership throughout so much of the world, cannot possibly be free to pursue its own way as long as its standards of well-being differ so much from those of other peoples. The fact that the average income per person in India is only about 2 percent of that in the United States must inevitably weigh us down.

As Homi Bhabha stated clearly in his address to the International Council of Scientific Unions, reproduced in the 4 February issue of *Science*, science and its interplay with technology will be deeply involved in the process of raising the standards of living in any nation. No underdeveloped nation can hope to go far on the road toward advancement unless it is prepared to develop science and technology along lines which match its resources and needs. In fact, the Western Europeans who generated the technological revolution also, along the way, transformed the relatively primitive science they inherited from the Arabs and Byzantines into the powerful and revolutionary tool that it is today.

There are occasions when all of us involved in science and public policy find it convenient to take the view that the development of science is the principal ingredient needed to achieve technological advancement. There is no doubt that only the scientifically advanced nations can expect to be in positions of leadership in the present world. On the other hand, it is easy to be convinced that one can go very far by borrowing pure science from other nations and putting it to work. Our own country really did not pull abreast of Western Europe in creative science until the second quarter of this century, by which time it was technically advanced by any standard. Its level of living was among the highest in the world well before it challenged Western Europe in competition for Nobel awards.

What was exceedingly important in our national history was the conscious will of those who settled here to meet at least halfway the opportunities our land offered. To that end both the immigrant and the native-born labored with remarkable devotion, perhaps losing along the way more of esthetic and cultural value than they should have.

To return to the Western Europeans, a study of their history shows that well before the Crusades in the 11th and 12th centuries, when they first became conscious of science, they had already won an enormous victory over the obstacles posed by the temperate regions north of the Alps. The technological surge the Europeans started more than a thousand years ago continued unbroken into the days of the caravels and on into the age of coal and steel. Science stood in the periphery during most of this time.

One must conclude that, as in the case of the United States, the primary source of advancement in Europe lay in the will of its people to improve their lot. Science became useful because men of will reached out for it.

We have a solemn and urgent duty to help the less-developed countries on their way by providing both knowledge and materials. The success of this partnership, however, will ultimately depend on the extent to which those in the less-developed lands are willing to sacrifice themselves and their way of life to the pursuit of technological development. One of Homi Bhabha's great contributions to India lies in the willingness he had to mold old traditions to new patterns of development.

—FREDERICK SEITZ, *National Academy of Sciences*

18–19. **Rural Health**, conf., Colorado Springs, Colo. (B. L. Bible, 535 N. Dearborn St., Chicago, Ill. 60610)

18–20. American **Psychosomatic** Soc. annual mtg., Chicago, Ill. (W. A. Greene, The Society, 265 Nassau Rd., Roosevelt, N.Y. 11575)

20–23. **Solar Energy** Soc., 2nd annual mtg., Boston, Mass. (F. Edlin, Arizona State Univ., Tempe 85281)

21–24. **Aerospace Instrumentation**, 4th intern. symp., College of Aeronautics, Cranfield, England. (E. K. Merewether, ISA Aerospace Industry Div., 4515 Canoga Ave., Woodland Hills, Calif.)

21–25. Institute of **Electrical and Electronics Engineers**, intern. conv., New York, N.Y. (IEEE, 345 E. 47 St., New York)

22–23. **Biomagnetics**, 3rd intern. symp., Univ. of Illinois, Chicago. (M. F. Barnothy, Univ. of Illinois, 833 S. Wood St., Chicago)

22–23. Modern Concepts of **Cardiovascular Diseases**, conf. and workshop, Reno, Nev. (G. T. Smith, Laboratory of Patho-Physiology, Univ. of Nevada, Reno 89507)

22–24. Measurement and Applications of **Neutron Cross Sections**, conf., Washington, D.C. (W. W. Havens, Dept. of Physics, Columbia Univ., 538 W. 120 St., New York 10027)

22–31. American **Chemical** Soc., spring mtg., Pittsburgh, Pa. (ACS, 1155 16th St., NW, Washington, D.C.)

23–25. Institute of **Mathematical Statistics**, Purdue Univ., Lafayette, Ind. (G. E. Nicholson, Jr., Univ. of North Carolina, Chapel Hill)

23–25. Modern Methods of **Weather Forecasting and Analysis**, Chicago, Ill. (J. R. Fulks, U.S. Weather Bureau, 5730 S. Woodlawn Ave., Chicago)

24–26. **Biomathematics and Computer Science** in the Life Sciences, symp., Houston, Tex. (Dean, Div. of Continuing Education, Univ. of Texas Graduate School of Biomedical Sciences, Texas Medical Center, Houston 77025)

24–26. Pediatric and Adolescent **Gynecology**, conf., New York Acad. of Sciences, New York. (W. R. Lang, Jefferson Medical College of Philadelphia, 1025 Walnut St., Philadelphia, Pa.)

24–26. **Pollution and Marine Ecology**, conf., Galveston, Tex. (S. M. Ray, Texas A&M Univ. Marine Laboratory, Galveston 77550)

24–27. International Assoc. for **Dental Research**, 44th general mtg., Miami, Fla. (G. H. Rovelstad, U.S. Navy Dental School, Natl. Naval Medical Center, Bethesda, Md. 20014)

25–26. National Assoc. of **Biology Teachers**, western regional conv., Los Angeles, Calif. (The Association, Professional Building, Great Falls, Mont.)

26–2. **Stress Analysis**, 3rd intern. conf., Berlin, Germany. (H. Kotthaus, Verein Deutscher Ingenieure, Prinz-Georg Str. 77/79, 4 Düsseldorf 10)

26–27. Arizona **Chest Disease** Symp., Tucson. (E. A. Oppenheimer, P.O. Box 6067, Tucson 85716)

27–30. American Assoc. of **Dental Schools**, Miami Beach, Fla. (R. Sullens, 840 N. Lake Shore Dr., Chicago, Ill.)

28–30. **Great Lakes Research**, 9th conf., Chicago, Ill. (B. M. McCormac, IIT Research Inst., 10 W. 35 St., Chicago 60616)

28–31. Collegium Intern. **Neuro-Psychopharmacologicum**, 5th biennial mtg., Washington, D.C. (M. K. Taylor, 3636 16th St., NW, Washington 20010)

29–31. **Airborne Infection**, 2nd intern. conf., Illinois Inst. of Technology, Chicago. (E. K. Wolfe, U.S. Army Biological Laboratories, Fort Detrick, Frederick, Md.)

29–31. **Applied Meteorology**, 6th natl. conf., Los Angeles, Calif. (B. N. Charles, Booz-Allen Applied Research, 6151 W. Century Blvd., Los Angeles 90045)

29–31. **Chemical** Soc., anniversary mtgs., Oxford, England. (General Secretary, Burlington House, London W.1)

29–31. **Surface-Active Substances**, intern. conf., Berlin, East Germany. (Inst. für Fettchemie, Deutsche Akademie der Wissenschaften zu Berlin, Rudower Chaussee 5, 1199 Berlin-Adlershof)

29–31. **Symbolic and Algebraic Manipulation**, symp., Assoc. for Computing Machinery, Washington, D.C. (J. E. Sammet, I.B.M. Corp., 545 Technology Sq., Cambridge, Mass. 02139)

29–1. American Assoc. for **Contamination Control**, 5th annual technical mtg., Houston, Tex. (W. T. Maloney, The Association, 6 Beacon St., Boston, Mass.)

29–1. Ultraviolet and X-ray **Spectroscopy of Laboratory and Astrophysical Plasma**, conf., Abingdon, England. (Inst. of Physics and the Physics Soc., 47 Belgrave Sq., London, S.W.1, England)

30. **Oral Cancer**, 4th symp., St. Francis Hospital, Poughkeepsie, N.Y. (M. A. Engelman, 1 E. Academy St., Wappingers Falls, N.Y.)

30–1. **Magnetohydrodynamics**, 7th symp., Princeton, N.J. (R. G. Jahn, Guggenheim Laboratories, Forrestal Research Center, Princeton, N.J. 08540)

31–2. Michigan **Acad. of Science, Arts, and Letters**, Wayne State Univ., Detroit. (E. A. Wunsch, Dept. of English, Univ. of Michigan, Ann Arbor)

April

1–2. Alabama **Acad. of Science**, Birmingham-Southern College, Birmingham. (W. B. DeVall, Dept. of Forestry, Auburn Univ., Auburn, Ala.)

1–2. Arkansas **Acad. of Science**, Little Rock. (G. E. Templeton, Univ. of Arkansas, Fayetteville)

1–5. National **Science Teachers** Assoc., New York, N.Y. (R. H. Carleton, 1201 16th St., NW, Washington, D.C. 20036)

1–7. American Acad. of **General Practice**, Boston, Mass. (M. F. Cahal, Volker Blvd. at Brookside, Kansas City 12, Mo.)

4–6. **Atomic Energy** Soc. of Japan, annual mtg., Tokyo. (M. Masamoto, Japan Atomic Energy Research Inst., 1-1, Shibatamura-cho, Minato-ku, Tokyo)

4–6. **Exobiology**, conf., Ames Research Center, Moffett Field, Calif. (Letters and Science Extension, Univ. of California, Berkeley 94720)

4–6. American Assoc. of **Physical Anthropologists**, Berkeley, Calif. (F. E. Johnston, Dept. of Anthropology, Univ. of Pennsylvania, Philadelphia 19104)

4–7. Federation of European **Biochemical** Soc., 3rd mtg., Warsaw, Poland. (T. Klopotowski, Polish Biochemical Soc., Freta 16, Warsaw)

4–7. Advances in **Water Quality Improvement**, conf., Univ. of Texas, Austin. (Special Lecture Series, Engineering Laboratories Bldg. 305, Univ. of Texas, Austin)

4–8. International **Biological Program**, 2nd general assembly, Paris, France. (F. W. G. Baker, 2 via Sebenico, Rome, Italy)

4–10. **Psychology**, 10th inter-American congr., Lima, Peru. (Intern. Soc. of Psychology, 2104 Meadowbrook Dr., Austin, Tex.)

5–7. Middle East **Neurosurgical** Soc., mtg., Jerusalem, Jordan. (F. S. Haddad, Orient Hospital, Beirut, Lebanon)

5–8. American Assoc. of **Anatomists**, San Francisco, Calif. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)

6–7. **Phlebology**, 6th intern. mtg., Aix-en-Provence, France. (F. Beurier, 94, cours Sextius, Aix-en-Provence)

6–8. **Electron and Laser Beam Technology**, Univ. of Michigan, Ann Arbor. (G. I. Haddad, Electrical Engineering Dept., Univ. of Michigan, Ann Arbor)

6–8. Recent Advances in **Phytochemistry**, intern. symp., Univ., of Texas, Austin. (T. J. Mabry, Dept. of Botany, Univ. of Texas, Austin 78712)

6–8. **Plant Phenolic** Group of North America, 6th annual mtg., Austin, Tex. (V. C. Runeckles, Imperial Tobacco Co., Montreal, P.Q., Canada)

7–8. Southern **Sociological** Soc., annual mtg., New Orleans, La. (J. J. Honigmann, Dept. of Anthropology, Univ. of North Carolina, Chapel Hill)

7–9. Southern Soc. for **Philosophy and Psychology**, New Orleans, La. (G. R. Hawkes, U.S. Army Medical R&D Command, Washington, D.C. 20315)

8–9. American Soc. for **Artificial Internal Organs**, Atlantic City, N.J. (B. K. Kusserow, Dept. of Pathology, Univ. of Vermont College of Medicine, Burlington)

8–11. **Animal Toxins**, intern. symp., Atlantic City, N.J. (F. E. Russell, Box 323, Los Angeles County General Hospital, 1200 N. State St., Los Angeles, Calif. 90033)

11–13. Institute of **Electrical and Electronics Engineers**, Region 3, conv., Atlanta, Ga. (M. D. Price, Dept. 72-14, Zone 400, Lockheed-Georgia Co., Marietta, Ga.)

11–13. Comparative **Hemoglobin** Structure, intern. symp., Salonika, Greece. (Secretary, P.O. Box 201, Salonika)

11–15. **Aeronomic Studies of Lower Ionosphere**, conf., Ottawa, Ont., Canada. (W. Pfister, Air Force Cambridge Research Laboratories, Upper Atmosphere Physics Laboratory, L. G. Hanscom Field, Bedford, Mass.)

11–15. American Assoc. of **Cereal Chemists**, New York, N.Y. (R. J. Tarleton, The Association, 1955 University Ave., St. Paul, Minn. 55104)

11–16. Federation of American Societies for **Experimental Biology**, 50th annual mtg., Atlantic City, N.J. The following societies will meet in conjunction with the FASEB; information may be obtained from FASEB, 9650 Rockville Pike, Bethesda, Maryland 20014:

American Physiological Society
American Soc. of Biological Chemists
American Soc. for Pharmacology and Experimental Therapeutics

American Soc. for Experimental Pathology
American Inst. of Nutrition
American Assoc. of Immunologists

12–13. Frontiers in **Food Research**, symp., Cornell Univ., Ithaca, N.Y. (W. F. Shipe, Dept. of Dairy and Food Science, Cornell Univ., Ithaca)

12–14. **Generalized Networks**, intern. symp., New York, N.Y. (H. J. Carlin, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201)

12–14. **Remote Sensing of Environment**, 4th symp., Univ. of Michigan, Ann Arbor. (Extension Service, Conference Dept., Univ. of Michigan, Ann Arbor 48104)

12–15. **Quantum Electronics**, intern. conf., Phoenix, Ariz. (J. P. Gordon, Bell Telephone Laboratories, Murray Hill, N.J.)

12–16. Society for Applied **Mathematics and Mechanics**, annual scientific mtg., Darmstadt, Germany. (F. Reutter, Gesellschaft für Angewandte Mathematik und Mechanik, Templergraben 55, 51, Aachen, Germany)

12–29. **Soil Conservation**, 1st Pan American congr., São Paulo, Brazil. (J. Abramides Neto, avda. Francisco Matarazzo 455, Caixa Postal 8366, São Paulo)

13–15. Institute of **Environmental Sciences**, 12th annual tech. mtg. and equipment exp., San Diego, Calif. (The Institute, 34 S. Main St., Mount Prospect, Ill. 60057)

13–16. **Geological Soc.** of America, southeast section, Univ. of Georgia, Athens. (L. D. Ramspott, Dept. of Geology, Univ. of Georgia, Athens 30601)

13–16. American **Orthopsychiatric** Assoc., 43rd annual mtg., San Francisco, Calif. (M. F. Langer, The Association, 1790 Broadway, New York 10019)

13–16. American **Radium** Soc., annual mtg., Phoenix, Ariz. (J. L. Pool, Memorial Soc., 444 E. 68 St., New York 10021)

13–16. National Council of **Teachers of Mathematics**, 44th annual mtg., New York, N.Y. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

14–15. British **Biophysical** Soc., spring mtg., Oxford, England. (D. Noble, Balliol College, Oxford)

14–15. **Molecular Interactions and the Crystallography of Ceramics**, Univ. of Nottingham, Nottingham, England. (S. C. Wallwork, Dept. of Chemistry, Univ. of Nottingham, University Park, Nottingham)

14–16. Association of Southeastern **Biologists**, Raleigh, N.C. (M. Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee)

14–16. American **Cleft Palate** Assoc., Mexico City, Mexico. (C. G. Wells, Parker Hall, Univ. of Missouri, Columbia)

14–16. Eastern **Psychological** Assoc., New York, N.Y. (M. A. Iverson, Queens College, Flushing, N.Y. 11367)

14–17. American Assoc. of **Endodontists** 23rd annual mtg., San Francisco, Calif. (J. F. Bucher, 6828 Winterberry Lane, Bethesda, Md. 20034)

14–19. American **Dermatological** Assoc., Hot Springs, Va. (R. R. Kierland, Mayo Clinic, Rochester, Minn.)

14–20. **Geodetical Measuring Technique and Instruments**, conf., Budapest, Hungary. (F. Raum, Preparatory Committee