SCIENCE

9 June 1961

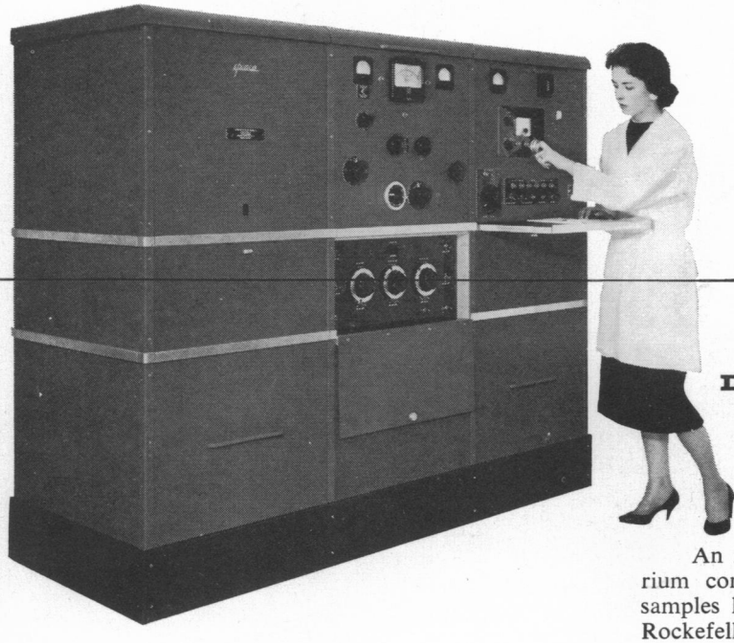
Vol. 133, No. 3467

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

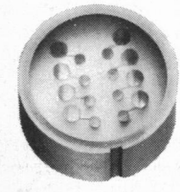
The **Analytical Ultracentrifuge**

. . . now more useful than ever

for studying molecules



Rapid Molecular Weight Determinations of Multiple Samples



An ingenious ultracentrifuge cell in which equilibrium conditions can be reached rapidly on multiple samples has been described by David Yphantis of the Rockefeller Institute.

The cell features multiple filling reservoirs and measuring chambers which allow a number of sample-solvent pairs to be studied simultaneously. The use of short column heights makes it possible to establish equilibrium conditions quickly. With an 0.8 mm column, equilibrium is attained in 15 minutes for sucrose (M.W.=342), 45 minutes for ribonuclease (M.W.=13,683), and 70 minutes for bovine serum albumin (M.W.=66,000).

The need for only a small volume of sample is another feature of this unusual cell which promises to find wide appplication for rapid measurements of molecular weight.

Density Gradients

Macromolecules of nearly identical density can be separated and measured by the powerful, rapidly developing technique of density gradient ultracentrifugation. A solution such as cesium chloride is centrifuged with the sample and a concentration gradient created in the cell by centrifugal force. The macromolecules of sample seek the level in the cell corresponding to their own density. The resultant discrete bands can be photographed by absorption optics.

An example of the extreme power of this method is shown here in the separation of DNA's, one containing N_{14}, the other N_{15}.

A summary of density gradient techniques for both analytical and preparative ultracentrifuges has been published by Spinco and copies are available on request.

Sedimentation of High Polymers

Of special interest to polymer chemists is a comprehensive summary on sedimentation of synthetic and natural polymers by R. L. Baldwin of the University of Wisconsin (now at Stanford) and K. E. Van Holde of the University of Illinois. The authors discuss in detail the kinds of information obtainable by ultracentrifugation, and methods used. An appendix lists polymers run on the Ultracentrifuge, solvents, and literature references.

The work appeared in the first issue of the German journal "Advances in Polymer Science"; reprints (in English) are available from Spinco.

If you are not familiar with the Ultracentrifuge, we will be happy to send you copies of "An Introduction to Ultracentrifuge Techniques" and the latest issue of "Fractions", a periodical sent to owners of Spinco ultracentrifuges, electrophoresis-diffusion instruments and amino acid analyzers. Write Beckman Instruments, Inc., Spinco Div., Stanford Industrial Park, Palo Alto 5, Calif.

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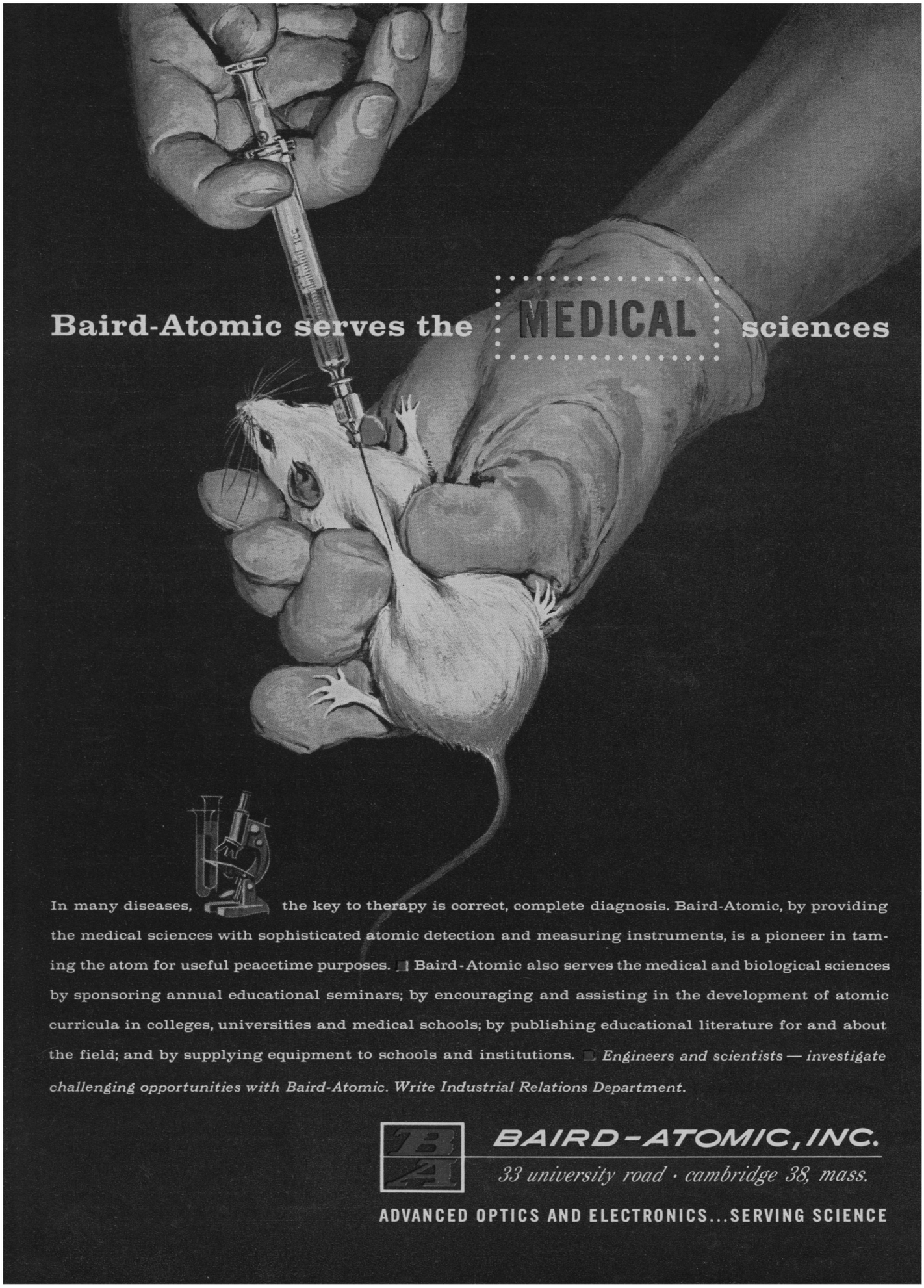

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9 June 1961, Volume 133, Number 3467

SCIENCE

Cover

Columns about 15 feet high in a basaltic lava flow near Buhl in southern Idaho. They were formed by contraction as the lava cooled. Contraction proceeded toward more or less equally spaced centers and produced a hexagonal network of vertical fractures, or joints, which bound the columns. The horizontal joints may have further relieved stresses within the columns as cooling continued. [Harold E. Malde, U.S. Geological Survey, Denver, Colo.]

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Exact measurement of hydrogen, oxygen and nitrogen in metals is made in a few minutes with the Serfass Gas Analyzer. It determines traces of these gases down to 0.1 part per million . . . can be used both for vacuum fusion and hot extraction. Here, a Fisher Technical Specialist (left) discusses a problem with the Assistant Chemist and Chief Chemist of Vanadium-Alloys Steel Co.

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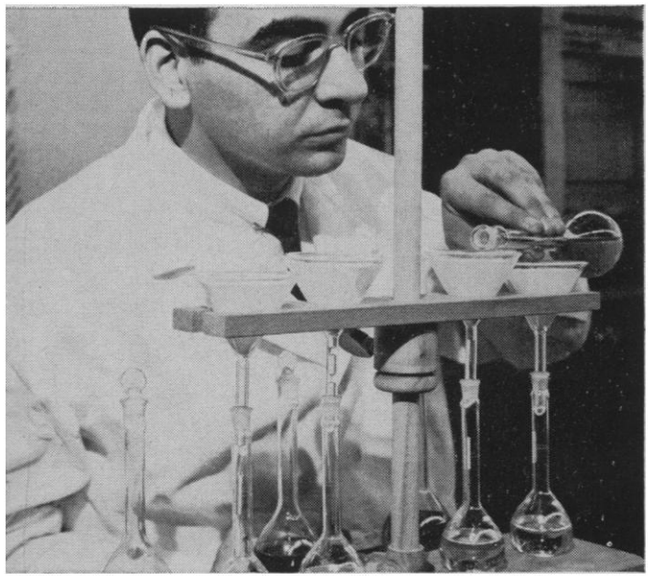

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Smooth Sailing

International scientific meetings offer an unparalleled stimulus to scientific progress; they assemble the world's most notable investigators to their mutual benefit; and they are especially stimulating to the younger scientists of the host country whose international contacts are more limited than those of their older colleagues.

Owing to our immigration laws and to their interpretation by the State Department in the past, successful international meetings have been difficult to arrange in the United States. Some foreign scientists have objected to the difficulty of obtaining visas, the extensive questionnaire that was required, the fingerprinting requirement, and their liability to be put in an ineligible category. Another difficulty has arisen from the travel restrictions imposed upon Soviet nationals, which have made it difficult to find suitable places to meet and routes by which the Russians could reach them.

But happily the last few years have seen some sharp changes in policy. Both Congress and the State Department have taken steps to ease visa difficulties, and the State Department is willing to open up restricted areas for international meetings. The change in attitude and policy became evident when Congress gave the State Department the right to waive the fingerprinting requirement in 1957. Additional small steps have been taken since. Only this spring the lengthy written questionnaire, which seemed to applicants to pry unnecessarily into their past and to be a test of their memory for their past affiliations and whereabouts in minute detail, was eliminated.

A more important change has been made in the interpretation of eligibility. The law governing immigration designates certain categories of persons as ineligible for visas, but it also provides for waiver of the provisions (except for saboteurs and espionage agents) by the Attorney General. Formerly the question of a waiver was seldom raised; now it is. The consul is more likely now to refer a case to the Department, and the Department is now more likely to ask the Attorney General to authorize a waiver. Thus a scientist who is invited to attend a meeting here or a scientist in good standing who wants to come on his own initiative will find his chances for success much better than in the recent past.

The other main difficulty that has beset international meetings in the U.S. is the imposition of travel restrictions on Soviet nationals. These restrictions were set up by the State Department in 1955 in response to the long-standing Soviet practice of closing large areas of the U.S.S.R. to foreigners. Since parts of every state and of most cities are on the restricted list, a meeting that Russians could attend was precluded unless special concessions were made. The State Department now makes such concessions for international meetings: meetings may be held in restricted areas, and Russians may visit sites connected with the official program. Restrictions on travel to and from the meetings are similarly relaxed.

The next big international meeting scheduled for the U.S. is that of the International Astronomical Union, to be held in Berkeley next August. This will put the new practices to the test. So far all preliminary arrangements have gone well, and a large international attendance, including about 100 from the Soviet Union, is expected. If the Berkeley meeting continues to enjoy smooth sailing—and there is every indication that it will—the outlook for future international meetings in the U.S. will be greatly improved—G.DuS.

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A place where guided missiles are tested phoned. They wanted to know about *Squalane* (Eastman 7311), the hydrogenated form of *Squalene* (Eastman 6966), a branched, polyunsaturated hydrocarbon derived from the liver of the basking shark. Some years ago we had mentioned in an advertisement that not only biochemists and oil chemists but also dogs found one or the other of these two compounds interesting. The man at the missile place wanted to know if there was anything in our squalane that would be harmful when painted on the missiles before firing so as to guide the trained dogs they send out sniffing over the impact area to bring back the fragments for examination. We reviewed our squalane specifications with him. They satisfied him, and they certainly ought to satisfy *anybody* who smears squalane on his missiles to guide dogs.

All of the more than 3900 organic chemicals listed in "Eastman Organic Chemicals List No. 42" are not sold for smell alone. For a copy of this list, write Distillation Products Industries, Inc., Rochester 3, N. Y. (Division of Eastman Kodak Company).

Latest advice on instrumentation film

Background: A photographic material is said to be "fast" if it requires little energy to deliver an image. The term comes from an olden time when portraitists were reducing the duration that the subject had to "hold it" from 5 minutes to 1 minute to a few seconds and on down. Only professors and their brighter students had clear notions of what energy meant. When the photographers did acquire an intuitive grasp of the concept, the physicists kept a step ahead of them by pointing out that the time rate of energy delivery to the emulsion was also important. At this, they were probably accused of pedantry, but unjustly.

The common man came to equate speed with merit in photography. The wise men were sad. "No," they countered patiently, "the faster the emulsion the larger the grains must always be. There is no escape." But there was.

Kodak Royal-X Pan Recording Film, given the proper low-contrast development, is the fastest material we have. This holds true both for hand-camera exposure times and for the very short exposure times of high-speed instrumentation. Royal-X Pan is very good to have when you need every bit of sensitivity you can get, but it is grainier than other Kodak films. Furthermore, its speed advantage over other good Kodak recording films shrinks and disappears altogether for high contrast and very short exposure times.

Very recent advances in emulsion technology have produced the new *Kodak Double-X Panchromatic Negative Film.* For very short exposure times and 8 minutes in Kodak Developer D-19, it is just about as fast as Royal-X Pan Recording Film, but its graininess is much less—on a par with the fine-grain and sharpness formerly attainable only in comparatively slow films.

If you want high contrast for very short exposure to green light, *Kodak Linagraph Ortho Film* is your ticket.

All of which tells you nothing of the physical forms of these and other Kodak films for instrumentation, including color film. If you are aware of the omission, you are a person who should send for the capsule-summary sheet "F3-297" from Eastman Kodak Company, Photorecording Methods Division, Rochester 4, N. Y.

Multiply thyself

Some scientific readers with itchy feet will thank us a little less than heartily for publishing this tip out in the open where the men who approve travel expense accounts can read it. For others the thrill is wearing thin of skittering continually here and there over the map to show their slides and speak their spiel.

Why not instead send out a box of slides, a *Kodak Cavalcade Projector,* a decent tape recorder, and a *Kodak Cavalcade Programmer* that ties them together in a presentation so alive that your own living presence will scarcely be missed? The time saved could be devoted to new efforts—raw material for slides yet unborn. In return for forgoing the pleasure of your company as entertainer, society gets more out of you as investigator. This is a pretty bold suggestion; whether society has advanced enough to deserve it yet remains to be seen. Far better that we give only the facts and leave the visions to the customers.

The Cavalcade Programmer is used by a speaker to pre-package his presentation in solitude so as to maximize its cogency and minimize dependence on others for accuracy and effectiveness. Its panel bears three control knobs and a pushbutton. The microphone from the tape recorder is plugged into the programmer instead of the recorder itself. The magazine of the Cavalcade Projector is loaded with the slides. The speaker starts his speech. At the instant when he wants the first slide to come on, he presses the button. This records a 6.5-kc beep on the tape. Now he is seeing exactly what the audience will be seeing at this point in the discourse. Pertinent points about it may well occur to him that might not occur when speaking with his back to the picture and his gaze fixed on some vindictive-looking character in the fourth row. When he wants the next slide he presses the button again; without further human intercession the beep will change the slide at that instant every time. And so on for the allotted time. The "erase" feature of tape, a benign presence denied to those who speak in the flesh, is always comfortingly there during the recording session.

Why three knobs on the panel? We are glad you asked.

As conceived for home entertainment and commercial promotion use, the device provides for musical ornamentation of the show. The knobs permit music from other sources to be mixed into the tape in proper balance to the narration. Scientists willing to let the prevailing mood of the presentation adjust itself without musical aid can find other uses for the additional aural supplementation. This capability may commend itself to ornithologists and psychiatrists, among others. There *must* be others who want to work in taped material from the field.

The Cavalcade Programmer can also be used for presentations by audio-visual methods other than tape-and-slides. (It can cue a movie projector into a slide show, for example.) Conversely, it can be used with tape and slides for purposes unrelated to speechmaking. (It can cue a time-lapse camera, for example, by beeps spaced according to a table of random numbers.)

Write for a deeper exposition of the Kodak Cavalcade Programmer and the name of a nearby dealer to Eastman Kodak Company, Apparatus and Optical Division, Rochester 4, N. Y.

How traditions start

Last summer we put in five days standing around at Woods Hole Marine Biological Laboratory and making conversation. We were trying to learn as much as we could about current photographic needs of biologists. The biologists were trying to find out what we could do for them. It seems to have been a fair exchange. We were invited back and have accepted with pride.

July 10 through 14, 1961

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This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

Meetings

Radioisotopes in Entomology and Tropical Medicine

Two international symposia were held recently on the uses of atomic energy in medicine and entomology. These were convened and sponsored by the International Atomic Energy Agency (IAEA) and the World Health Organization (WHO). These United Nations organizations had as objectives the bringing together of specialists from all over the world to review the present state of research and the current uses of radiation and radioisotopes in medicine and entomology. Other objectives were to focus attention on medical and entomological problems in tropical areas and to stimulate new or additional research in various countries. An important aim was the bringing together of specialists with diverse technical backgrounds to give broad perspective, to introduce new and improved research techniques, and to stress the potential uses of radioisotopes.

At the invitation of the government of India, the International Atomic Energy Agency convened a "Symposium on Radioisotopes and Radiation in Entomology" in Bombay from 5 to 9 December 1960. Member countries of the U.N. were invited to send specialists to present papers and participate in discussions. Participants were sent by France, Germany, the Holy See, India, Italy, the Netherlands, Pakistan, the Philippines, the U.S.S.R., the United Kingdom, and the United States. Participants from the United States, invited and sponsored by the U.S. Department of Agriculture and the National Science Foundation, were B. W. Arthur, L. E. Brownell, J. E. Casida, T. L. Hopkins, and D. E. Weidhaas; D W. Jenkins, the other U.S. participant, was sponsored by IAEA and WHO.

The symposium included sessions on the behavior of labeled insecticides in plants and animals, insect physiology and biochemistry, radiation effects and insect control, ecological and biological studies, and local problems in agricultural entomology. The present enormous loss due to insect damage to crops and stored grain and other agricultural products and to parasitism in domestic animals was emphasized in relation to the rapid increase in human population. Many outstanding accomplishments involving use of radioisotopes were presented, including elimination of the screw-worm fly in Florida by release of sterile males, development of new insecticides, control of pests in stored products through irradiation, and use of lethal genes for control studies.

A "Symposium on the Use of Radioisotopes in the Study of Endemic and Tropical Diseases" was sponsored jointly by WHO and IAEA. This symposium was held at the invitation of the government of Thailand, in Bangkok, on 12 to 16 December. These United Nations organizations invited selected experts in tropical medicine and in the medical use of radioisotopes to present lectures and participate in discussions. Specialists were invited from Australia, Ceylon, Nationalist China, India, Iraq, Pakistan, the Philippines, Portugal, Sweden, Thailand, the Union of South Africa, the United Kingdom, the United States, Venezuela, and Vietnam. The invited speakers from the United States were H. H. Anderson, D. W. Jenkins, and J. B. Stanbury. The symposium was organized by joint scientific secretaries from WHO and IAEA. The scientific sessions were on nutrition, anemias, endemic goiter, electrolytes, entomology, and parasitology. In each session discussion of the major problems by a specialist was followed by papers on the use and potential use of radioisotopes and radiation. In active discussion, emphasis was placed on close relationships between areas such as nutrition, parasitism, and disease and on the need for broad and coordinated research programs. The continuing and urgent need for research to improve the health of people in the tropics was stressed. Atomic energy was shown to be of great value in medical and biological research in tropical areas, and outstanding accomplishments are expected.

The proceedings of the two symposia will be published by the IAEA and will be available from that organization in the near future.

DALE W. JENKINS
U.S. Army Chemical Corps Biological Laboratories, Fort Detrick, Maryland

Forthcoming Events

July

1–3. Astronomical League, Detroit, Mich. (W. A. Cherup, 4 Klopfer St., Millvale, Pittsburgh 9, Pa.)

2–7. American Physical Therapy Assoc., Chicago, Ill. (Miss L. Blair, Executive Director, APTA, 1790 Broadway, New York 19)

2–9. Rural Medicine, 1st intern. congr., Tours, France. (Prof. Vacher, Secretaire General, c/o Institut National de Medecine, Agricole, Ecole de Medecine, Tours)

3–6. Clay Minerals, colloquium on genesis and synthesis of, intern., Paris, France. (Prof. Hocart, Faculté des Sciences, Université de Paris à la Sorbonne, 47 rue des Ecoles, Paris 5)

3–8. Treatment of High Level Radio-

active Wastes, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärtner Ring, Vienna 1)

3–16. Durability of Concrete, symp., Intern. Union of Testing and Research Laboratories for Materials and Structures, Prague, Czechoslovakia. (B. Hacar, Director, Inst. of Theoretical and Applied Mechanics, Czechoslovak Acad. of Sciences, Solínova 7, Prague 6-Dijvice)

4–8. Latin-American Assoc. of Physiological Sciences, 4th meeting, Ribeirão Preto, Brazil. (C. R. Diniz, Caixa Postal 301, Ribeirão Preto, Estado de São Paulo)

5–8. European Organization for Research on Fluorine and Dental Caries Prevention, 8th meeting, London, England. (J. R. Forrest, Senior Dental Officer, Ministry of Health, Savile Rd., London)

5–8. Optical Materials, colloquium, Intern. Commission for Optics, Paris, France. (Institut d'Optique, 3, Boulevard Pasteur, Paris 15)

5–9. International Convention on Radio Techniques and Space Research, Oxford, England. (British Institution of Radio Engineers, 9 Bedford Sq., London, WC.1)

5–12. International Ophthalmic Optical Congr., London, England. (G. H. Giles, Intern. Optical League, 65 Brook St., London, W.1)

6–7. Free Radicals, intern. symp., 5th, Uppsala, Sweden. (Symposium Secretariat, c/o Inst. of Physical Chemistry, Uppsala)

6–12. Agricultural Medicine, 1st intern. congr., Tours, France. (J. Vacher, Institut National de Medecine Agricole, Ecole de Medecine, Tours)

6–12. Ribonucleic Acids and Polyphosphates: Structure, Synthesis and Function, intern. colloquium, Strasbourg, France. (Prof. Ebel, Faculté de Pharmacie, Université de Strasbourg, Strasbourg)

9–14. Bio-Medical Electronics, 4th intern. conf., New York, N.Y. (H. Schwan, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia 4)

9–15. American Library Assoc., annual conf., Cleveland, Ohio. (D. H. Clift, 50 E. Huron St., Chicago, Ill.)

9–15. International Dental Federation, 49th annual session, Helsinki, Finland. (Office of Secretary General, IDF, 35 Devonshire Place, London, W.1, England)

10. Bibliographical Soc. of America, Cleveland, Ohio. (E. Wolf II, Library Co. of Philadelphia, Broad and Christian Sts., Philadelphia 47, Pa.)

10–14. Institute in Technical and Industrial Communications, 4th annual, Fort Collins, Colo. (Director, Inst. in Technical and Industrial Communications, Colorado State Univ., Fort Collins)

10–14. International Congr. of Dietetics, 3rd, London, England. (Miss D. F. Hollingsworth, British Dietetic Assoc. 251 Brampton Rd., London, S.W.3)

10–14. International Diabetes Federation, 4th congr., Geneva, Switzerland. (B. Rilliet, Secretary General, 4 Boulevard des Tranchees, Geneva)

10–14. Optical Instruments and Techniques, conf., London, England. (K. J. Habell, Natl. Physical Laboratory, Teddington, Middlesex, England)

10–20. Plant Exploration and Introduction, technical meeting on, Food and Agriculture Organization of the U.N., Rome, Italy. (Intern. Agency Liaison Branch, Office of the Director General, Viale della Terme di Caracalla, Rome)

10–24. Medical Electronics, 4th intern. conf., New York, N.Y. (L. E. Flory, David Sarnoff Research Center, Princeton, N.J.)

11–25. World Meterological Organization, 3rd South American session, Rio de Janeiro, Brazil. (WMO, 1 Avenue de la Paix, Geneva, Switzerland)

12–18. Radioactivity in Food and Agriculture, Expert Committee on the Organization of Surveys for FAO, Rome, Italy. (Intern. Agency Liaison Branch, Office of the Director General, Viale della Terme di Caracalla, Rome)

13–14. Data Acquisition and Processing in Biology and Medicine, conf., Rochester, N.Y. (Office of Public Information, Univ. of Rochester, River Campus Station, Rochester 20)

15–18. Life Insurance Medicine, 7th intern. congr., Lisbon, Portugal. (L. de Carvalho Cancella, Secretary, Parede, Portugal)

16–18. British Congr. of Obstetrics and Gynaecology, 16th, Bristol, England. (Secretary, British Congr. of Obstetrics and Gynaecology, University Dept. of Obstetrics, Southmead Hospital, Bristol)

16–22. International Soc. for Clinical and Experimental Hypnosis, Rio de Janeiro, Brazil. (ISCEH, 33 E. 65 St., New York 21)

17–22. Soil Mechanics and Foundation Engineering, 5th intern. conf., Paris, France. (E. Caminade, Secretaire General, 23 rue de Cronstadt, Paris 15)

(See issue of 19 May for comprehensive list)