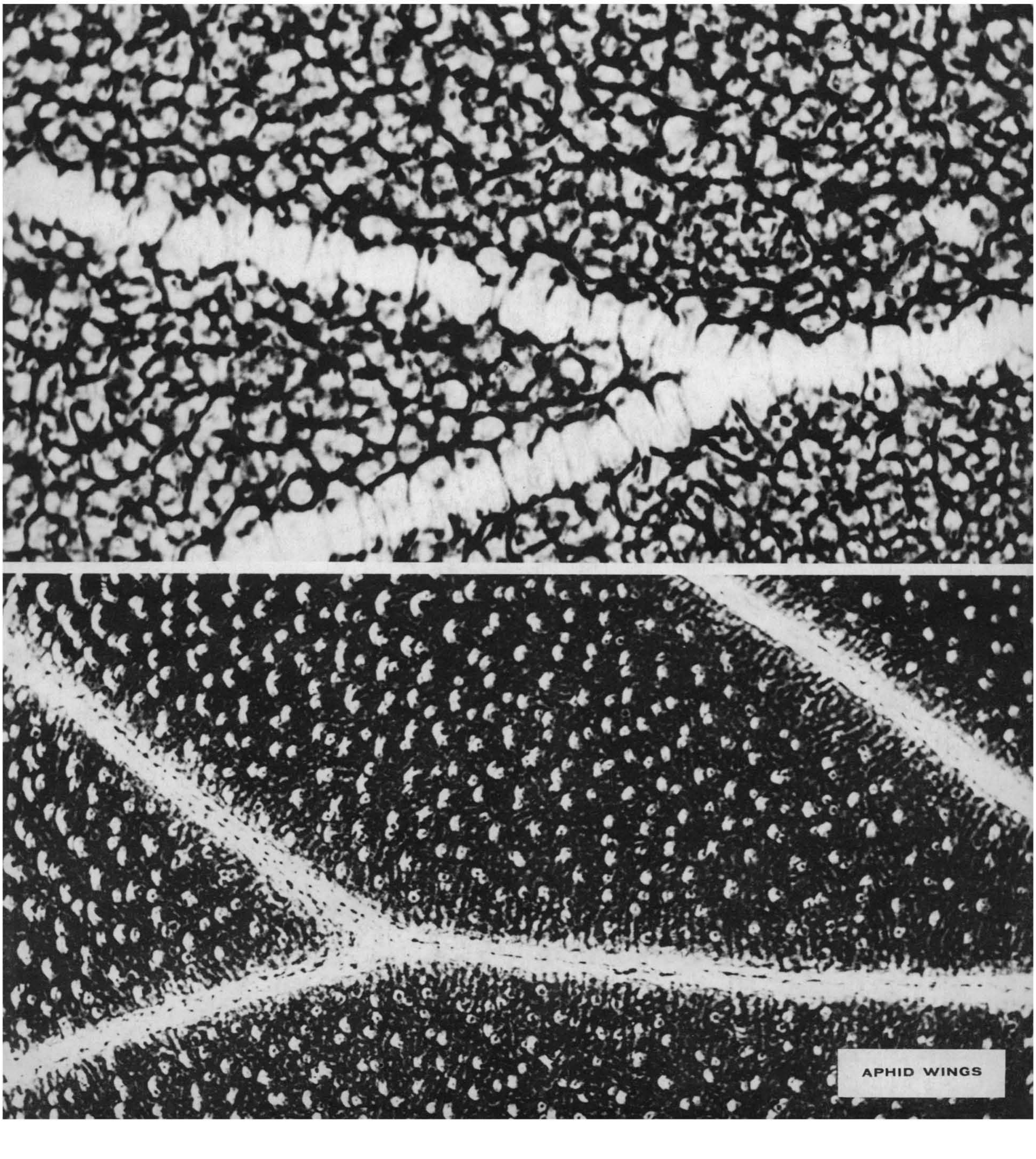
SCIENCE

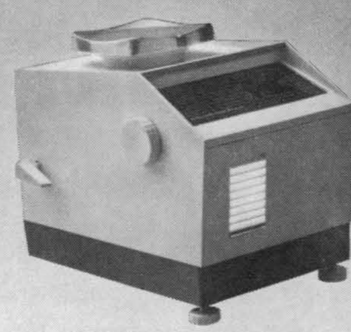
6 May 1966
Vol. 152, No. 3723

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



APHID WINGS

Easy on the eyes, isn't it?



The unique new digital projection scale is clearer and easier to read than anything previously available in top loaders.

Other significant advantages of the new *Sartorius Series 2200* include: • improved accuracy/capacity ratio as compared to previously available top loaders • auxiliary coarse scale for rapid loading and taring • single control knob for both coarse- and fine-taring • all models equipped for "weighing below" • loading capacity of all models (except #2205) may be increased by exchanging a Sartorius bowl for the regular weighing pan. For additional information write to:

MODEL	2201	2202	2203	2204	2205	2206
CAPACITY						
Weighing Range	5000 g	5000 g	3000 g	1000 g	160 g	1000 g
Max. Load with Taring	8000 g	7000 g	5000 g	1600 g	170 g	3000 g
OPTICAL RANGE	1000 g	1000 g	1000 g	100 g	10 g	1000 g
One Scale Div. (digital)	1 g	1 g	1 g	0.1 g	10 mg	1 g
Readability	0.1 g	0.1 g	0.1 g	0.01 g	1 mg	0.1 g
PRECISION	±0.01 g	±0.05 g	±0.05 g	±0.005 g	±0.5 mg	±0.05 g
TARING						
Zero Adjustment of Optical Scale	1000 g	1000 g	1000 g	100 g	10 g	1000 g
PRICE	$850.	$795.	$695.	$675.	$760.	$495.

sartorius balances

Division of Brinkmann Instruments, Cantiague Road, Westbury, L.I., New York 11590

6 May 1966
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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Chitin patterns in wings of aphids and other insects are revealed by contact photography on high-resolution plates. These prints, enlarged about 300 times from contact negatives, show variations in pattern that characterize aphid genera. No lens was used in making the negatives. See page 757. [Frank P. McWhorter, Oregon State University]

Kodak advertises:

fast, emotion-free flareups on film . . . unused capacity for oxidizing cellulose . . . processing mailers for professional use

For the solar patrol

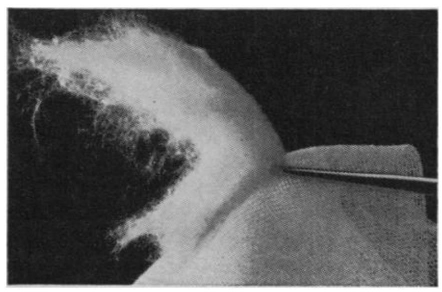
A line of KODAK RAR Films was launched some 18 months ago. RAR happens to be the initials of the phrase "rapid access recording." RAR Films can be processed in solutions as hot as 130°F. From this follows a train of consequences. The hotter a chemical reaction, the quicker the results. The quicker exposed film turns into usable images, the shorter the length of film in process at a time. The less film to be contained in the processing equipment, the smaller the equipment. The smaller a piece of capital equipment, the less imposing. The less imposing, the fewer the people attracted to tend it. The fewer tenders, the less the cost. The less the cost, the more justifiable to strive for the benefits in view. The train at this point enters the tunnel of value judgments, which is ventilated by gusts of emotion.

Emotional response is not wanted from images recorded on the various RAR Films. All are used for capturing data in analog or digital form. One of our newest films of this type is designated "SO-375." It has been emotionally received by one team that tried it out and promptly proclaimed it the greatest thing that ever came down the pike. The team is employed by a very large company that is interested in sunspots.

On February 23, 1956 the sun flared up with more than 10^{32} ergs of electromagnetic and corpuscular emission ranging from 10^{-8} cm to 3×10^{3} cm in wavelength and 1 Kev to 15 Bev in kinetic energy. Such outbursts could conceivably affect the comfort and safety of extraterrestrial travel as well as the dependability of terrestrial communications. The International Quiet Sun Year has ended. The 11-year sunspot cycle is on the upswing, as are those travel plans. Along with those plans go plans to keep an eye on sunspots. If a world-wide sunspot patrol can help understand and predict flares, it appears justifiable. Solar markings show up best by Hα light. A 0.5 Å band width is about right. With much more band-pass than that the continuum from the photosphere takes over. Shifting the band 0.5 Å redward or violetward also proves astrophysically illuminating. But 0.5 Å is a pretty thin slice of spectral energy, even for photographing the sun. The previous film favorite for solar markings was beginning to get a little strained for both speed and granularity as improvements in filters narrowed the band-pass and improvements in solar knowledge enhanced interest in the sun's own fine granularity. The new "SO-375" takes up the burden. Its rapid-access feature may prove useful when reliance is placed on world-girdling chains of sunwatching stations to send out flare alerts in seconds. More valuable than its speed, it seems, are its high contrast and the high density attainable. Maybe it *is* the greatest thing that ever came down the pike.

Information about "SO-375" is obtainable from Eastman Kodak Company, Special Applications, Rochester, N.Y. 14650.

Cotton that dissolves in blood and has affinities



Though not pharmaceutical manufacturers ourselves, we are something of a factor in that industry as supplier. One among many items we supply it is oxidized cellulose.

Thirty years ago W. O. Kenyon, who today supervises the Chemistry Division of the Kodak Research Laboratories, and E. C. Yackel found that nitrogen dioxide can preferentially replace several of the 19 hydrogens in the unit cell of the cellulose polymer by oxygen atoms. The cotton still looks and behaves like cotton, retains much of its original tensile strength and nearly all of its resistance to plain water, but dissolves at the pH of dilute aqueous solutions of sodium bicarbonate, amines, quaternary ammonium salts, and of blood.

That part about blood found it an application in surgery that is still important today. We oxidize surgical gauze and cotton and turn it over to leading producers of surgical materials. They do the sterilizing and the distribution to the medical profession. We don't know very much about surgery or many details about how surgeons handle oxidized cellulose. We understand that from the hands of dentists some of our output finds its way into freshly vacant tooth sockets. We further understand that apart from its physical properties, its chemical affinities have been found useful by at least one pharmaceutical manufacturer whose purchases of the material from us are highly correlated to the national demand for pork, since he is turning out a hormone for which the production volume depends on the availability of hog pituitaries in great abundance. We know of one scientific paper ("Purification of Corticotropin with Oxycellulose," *J.A.C.S.* 73:2969 (1951)) which reports 40-fold concentration of crude corticotropin in a single step and suggests oxycellulose as a fractionation medium for other purposes where ion-exchange resins don't work well.

One thing we do know for sure is that the installation where we oxidize cellulose is operating much too far below its capacity. Costs would come down and all would rejoice if some bright souls who may have never heard of oxidized cellulose till now should find some new reasons to need a lot of it. Let them get in touch with Eastman Chemical Products Inc., Kingsport, Tenn. 37662 (Subsidiary of Eastman Kodak Company).

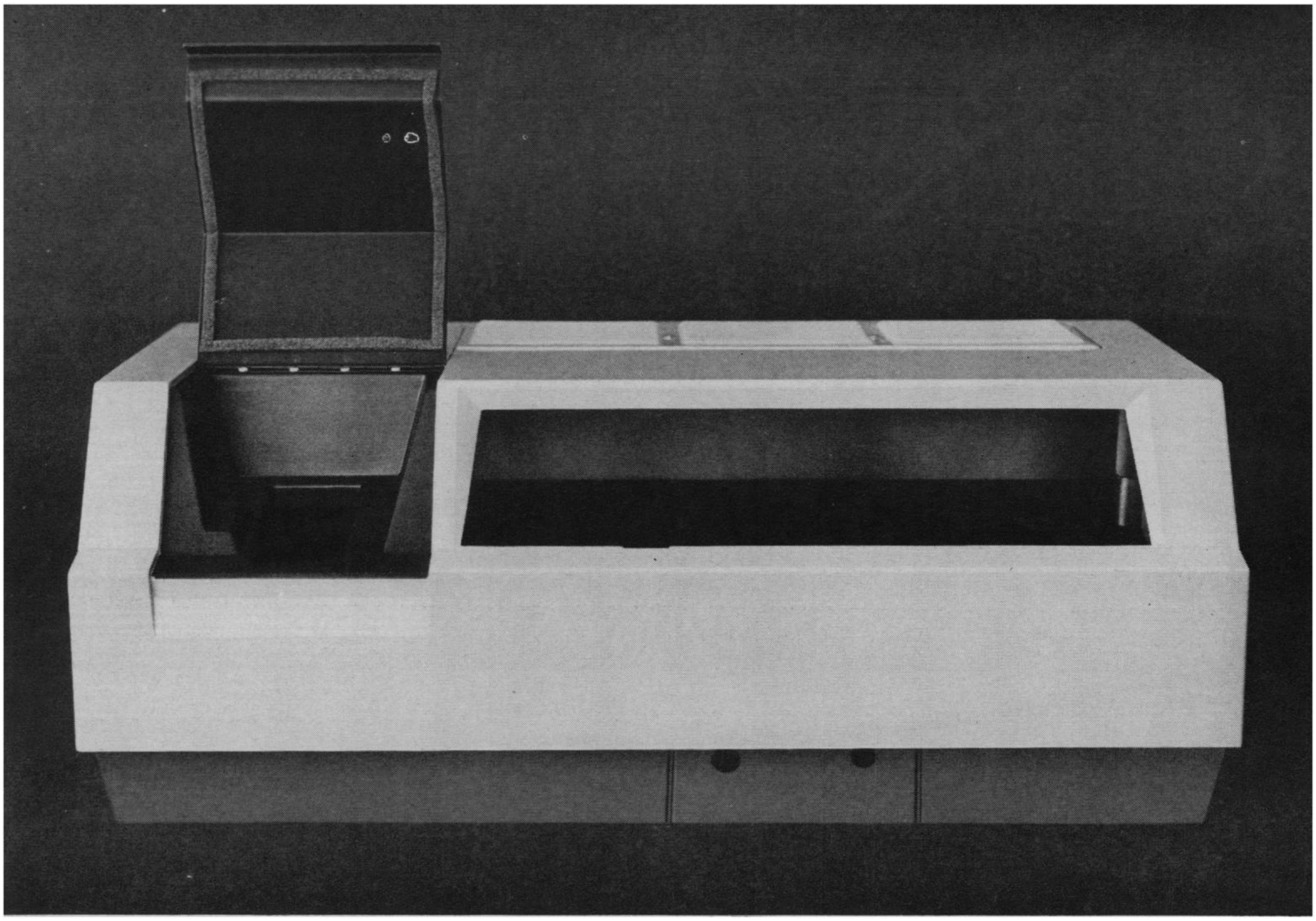
Color is carefree

In technical movies such as those that expand time, compress it, or just faithfully record action, the information capacity that color adds now seems indispensable. Because gratifying numbers of non-technical movie-makers are happily shooting away non-technically in color, Kodak color processing stations can find economic support for their fussy operations at a reasonable price. To pay for the service, the customer purchases a processing mailer from his Kodak dealer. In it he mails us his exposed footage, which we promptly mail back to him ready for the projector. He needn't even know what pH stands for. That's why, from a non-technical viewpoint, color has come to be so much simpler and so reliable.

For the technical user, one small fly has lingered in the ointment, proliferating. Home-style color film is not the only kind. What if his application requires the strength, dimensional stability, environmental resistance, or thinness of ESTAR Base color film? What if his conditions call for the speed and color-differentiating powers of KODAK EKTACHROME MS Film, or the even greater speed of KODAK EKTACHROME ER Film, or the enhanced sharpness of the new KODAK EKTACHROME EF Film? Where are the handy-dandy KODAK Prepaid Processing Mailers for those who cannot restrict themselves to KODACHROME Film?

Answer to that last question: At your Kodak dealer's, effective now. The primacy of fun as justification for photography has been successfully challenged.

Answers to other questions about color movie film for technical use: From Instrumentation Products, Eastman Kodak Company, Rochester, N. Y. 14650.



This is a case for something new...

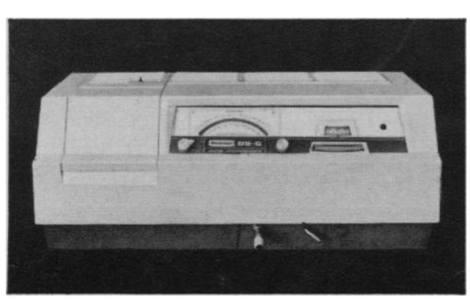
A new DB® Spectrophotometer? Yes, Beckman now offers the proven performance of the DB Spectrophotometer in a new grating version. It's called the DB-G Grating Spectrophotometer. It sells for $2595 — only $225 more than the prism DB. Both versions, which are identical except for optics, give you these advantages:

Wavelength Range. The 205-770 mμ range of the DB is extended to 190-700 mμ in the new DB-G. Add an inexpensive detector and go to 800 mμ with the DB-G. Both instruments give high resolution and wavelength accuracy, plus the proven performance common to Beckman Spectrophotometers.

Dependability. Both use time-proven electronics and optics. Since their introduction five years ago, several thousand DB Spectrophotometers have established an outstanding record of dependable service.

Rapid, simple operation. Set the desired wavelength, insert the sample and reference, and read the meter. Ten minutes training and even your least experienced technician can operate the DB. And the double-beam design saves 60-80% of the time required for routine single-beam analysis.

Versatility. A full line of low-cost accessories greatly enhances the use of DB Spectrophotometers. Add a Beckman recorder to either version and you have a precision, double-beam, ratio-recording instrument priced at a thousand dollars less than comparable instruments. Other accessories permit wavelength scanning, reflectance studies, and atomic absorption measurements.



Does this sound too good to be true? Call your local Beckman Sales Engineer and have him show you both prism and grating DB Spectrophotometers. Or write for Data File LUV-165. You get a lot more than you expect when you get a Beckman DB Spectrophotometer.

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it this way, too. And China will lose interest in killing foreigners as its romantic willingness to sacrifice Chinese lives diminishes.)

In a paper (unclassified but unpublished) on integral, quick-access, multi-use shelters in new buildings, Richard I. Condit, of Stanford Research Institute, once warned that the shelter portion should be the only truly hardened part of a building, and that nothing else in the city should be hardened; an attacker should be given no incentive for increasing the intensity of his attack. Condit hypothesizes that the attacker would tend to be economical and would be willing to allow people to survive if he could deprive them of their city (and the power and wealth it embodies). I think he correctly assumes that destruction of wealth and power rather than life would be the main conscious and unconscious motivation of the attacker.

Unless it can be proved that nuclear attacks would be launched only by implacable fanatics intent on wiping out entire populations (and intent on little or nothing else, ever) some level of civil defense high enough to make a real difference looks like a prudent investment. Even very high levels are not really provocative, since an American shelter cannot kill a single Russian or knock out a single factory, missile silo, railroad yard, or harbor.

NICHOLAS ROSA
1101 Woodside Road,
Redwood City, California 94061

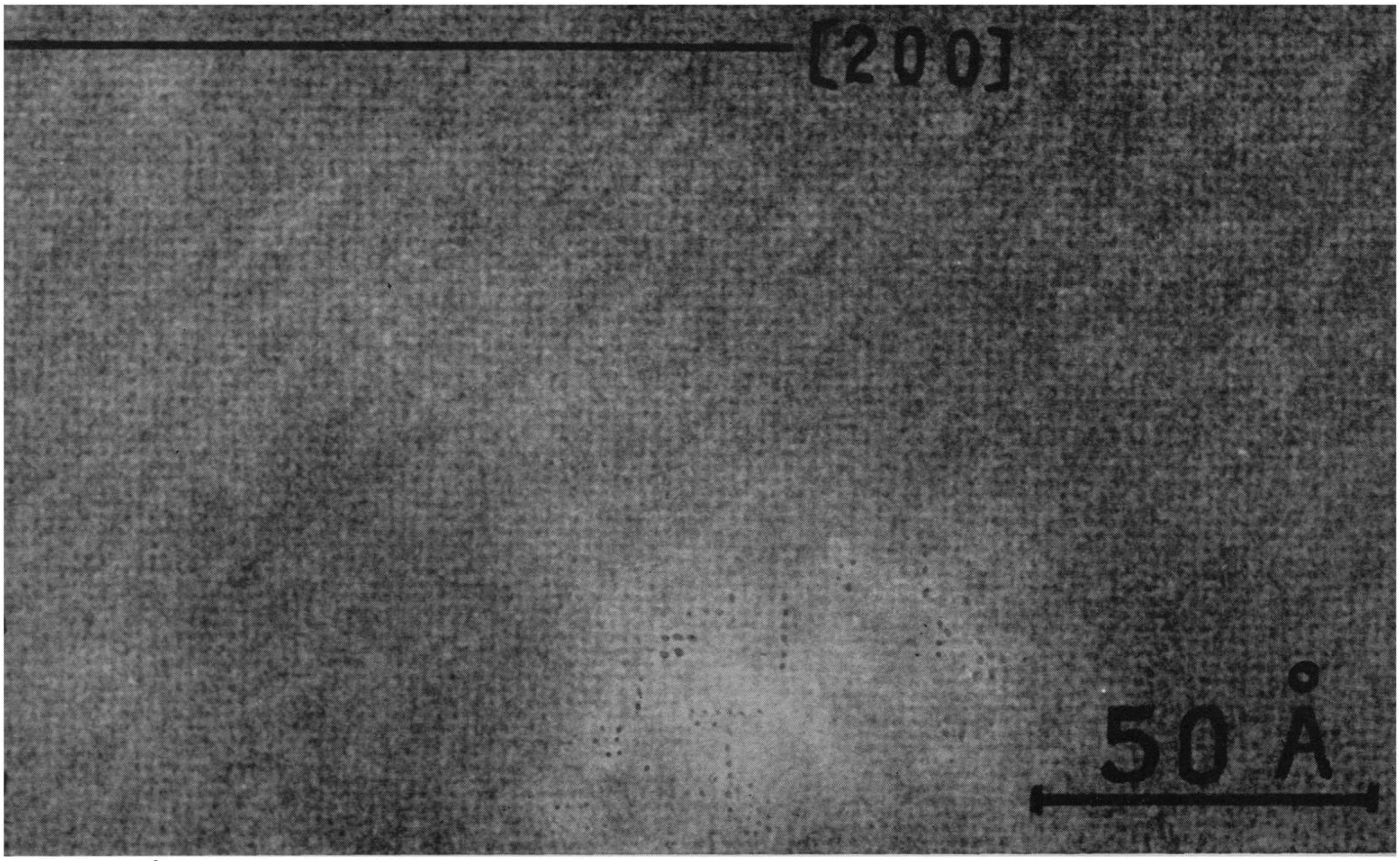
The Grant System

The system of individual project awards made on the basis of scientific merit after careful evaluation by panels of experts recruited from across the country has been a large factor in establishing the high quality of science in our larger centers and in the steadily rising standards in smaller, outlying institutions. The success of this system has been widely acknowledged (see the remarks of Monod in Report from Europe, *Science*, 19 Nov. 1965).

Don K. Price (21 Jan., p. 285) and D. S. Greenberg (*Harpers*, Jan. 1966) pinpoint this as the key issue in the current effort to substitute large institutional grants for individual project awards. The issue is put squarely by Price: "But as the government broadens the basis on which it gives support to universities and begins to make much broader grants for institutional or program support, the scientific ability of particular investigators becomes proportionally less important and more importance attaches to a vast range of subjects on which the specialized scientific knowledge of an advisory panel is much less decisive." He goes on, "It would be positively to the advantage of the universities, I believe, if their own members did not have so predominant an influence in making of grants to them, and if the government should rely a great deal more on a career government service of high quality." The practical development of this point would be the award of large bulk sums to individual institutions and the eventual elimination of direct support of talented individuals.

In my opinion the hazards and losses in assigning to institutions nearly total control of their research funds are much greater than those of the present system. We already have an example of the possibilities. The Sloan-Kettering Institute has been awarded a lump sum of $4.3 million dollars, 47 percent of its research budget, replacing individual support for 52 projects. This will, in the words of the New York *Times* (12 Jan.), "with very few restrictions enable the recipient institution to use the funds from the so-called 'single instrument' grant as it sees fit. For example, it could use money originally ear-marked for a slow moving program for the swift expansion of research on a 'breakthrough.' In effect, this method expresses support for an institution's total research program, a spokesman for the Public Health Service said in a telephone interview."

The basic problem seems to be a failure to recognize that nearly all important advances in knowledge come initially from individuals with good ideas and not from the planned exploitation of problems selected by career administrators. The very purpose of the scientific endeavor is lost in the concern for efficiency and quick returns and a politically satisfying distribution of funds. In general, scientists are working to obtain new knowledge of ultimate use to mankind. If this goal is important, then we should be giving our greatest support to the most competent and creative individuals. Who is better prepared to make the judgment of competence than other scientists? What criteria other than scientific merit should take precedence?



No. 5 in a Series

ADVANCES IN ELECTRON MICROSCOPY

The very high resolution electron micrograph of the (200) and (020) planes of gold crystal (2.04 Angstroms) was taken on the Hitachi Perkin-Elmer HU-11B Electron Microscope at the Hitachi Central Research Laboratory in Japan. It represents a severe test of all parameters of electron microscope design.

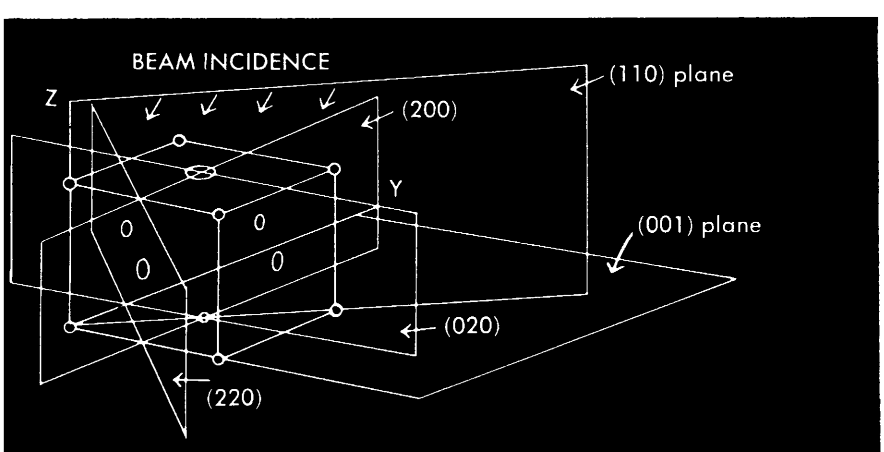
Experimental Conditions

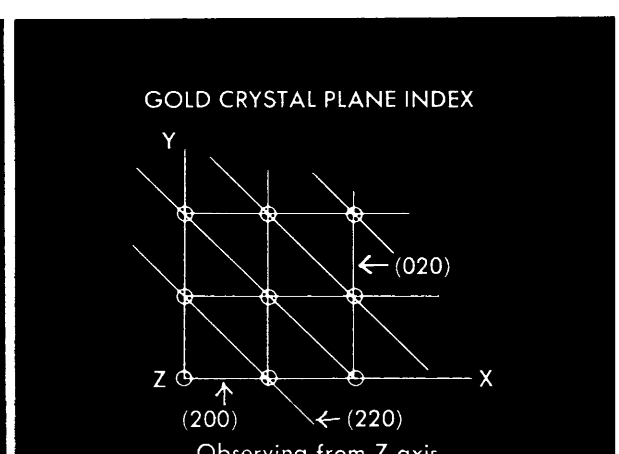
1. The (001) direction of the gold crystal film was aligned to the optical axis of the electron microscope.
2. The illuminating system was tilted within the (110) plane to satisfy the Bragg condition against the (220) plane. With this orientation, chromatic aberration is reduced for the (200) and (020) spacings as well as the (220) spacing.
3. The perpendicular lattice images (200) and (020) were observed simultaneously when the above conditions were satisfied. Because the spherical aberration, electronic and thermal drift and astigmatism are very small, the resolution shown in the micrograph is very high.

Gold Crystal Lattice Planes	Spacing
(200)	2.04 A
(020)	2.04 A
(220)	1.43 A

This is the highest resolution yet achieved on an electron microscope. Another example of Hitachi Perkin-Elmer leadership in electron microscopy.
Complete information on the HU-11B as well as a glossy print of the above micrograph can be obtained by writing to: The Perkin-Elmer Corporation, Distributor Products Dept., 723 Main Avenue, Norwalk, Conn.

PERKIN-ELMER





The study sections and advisory panels of the National Institutes of Health and the National Science Foundation provide scientists with a critical review by a broadly selected (and rotating) group of their peers who are not subject to the pressures of local politics and who have the opportunity and experience of comparing applications from all over the country. A grant application approved by an advisory panel in Washington is an important vote of confidence; disapproval should give the applicant serious cause for soul-searching. Certainly there are mistakes, but, in my judgment, far fewer than would be made by local review. Allocation of research funds within an institution is much more likely to perpetuate mediocrity and incompetence; recognition of new ideas or far-sighted proposals may be much more infrequent.

There is much merit in having panels of experts well informed on the advanced thinking of the scientific community as expressed in grant applications. In the long run, the good that is done by having these open lines of communication far outweighs any possible damage to the private enterprise of idea ownership. There is also, via this route, considerable dissemination of knowledge about investigators, young and old. There is great revenue in cross-fertilization. Moreover. the large numbers of working scientists coming to Washington to serve on study sections maintain a flow of information and personal contact with government officials that is necessary for mutual understanding and cooperation. . . .

The present project-award system may not lend itself too well to the development of new schools and departments. This problem could be handled by a separate system of institutional and departmental grants-in-aid. Similarly, funds for regular teaching could come from separate sources. For older and established institutions, the general research-support grant contributes to flexibility; it should not, however, be enlarged to replace project support to individuals.

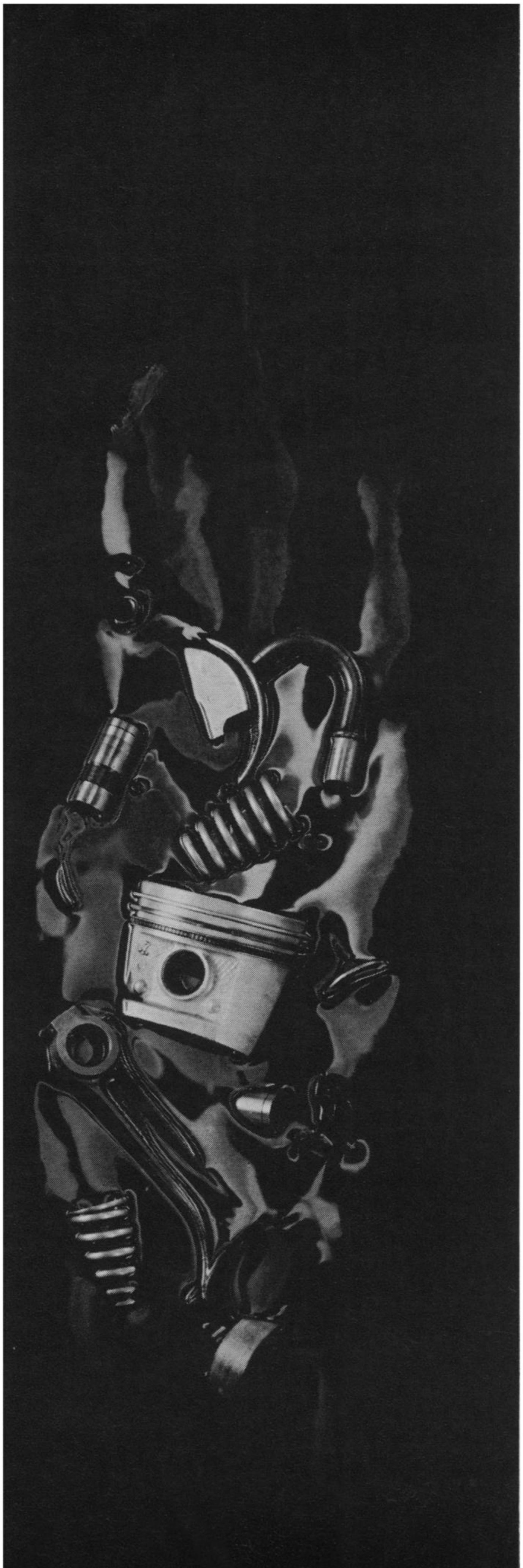
Critical periodic evaluation of the individual on the basis of scientific merit by a distant, semi-anonymous panel of peers is a source of strength to institutions. The frequently expressed danger of loss of loyalty or control of grantees should hardly be a problem if the institution maintains control over the initiation of research applications and over hiring, firing, and the allocation of space.

JEROME GROSS
Massachusetts General Hospital, Boston 02114

The Exclusive "Graduate" Course in Advanced-Degree Programs

One of the criteria used by accrediting committees when evaluating graduate programs at universities strikes me as being trivial but pernicious. It is the distinction between "graduate courses" and "senior-level courses carrying graduate credit." In my opinion, the only valid case for herding graduate students together and excluding the undergraduates is that graduate enrollments may be so large that it is inconvenient to enroll undergraduates in the same classes. Many accrediting committees gather data on the proportion of "graduate" courses in an advanced-degree program, implying that this proportion gives an indication of the quality of the program. Consequently, many institutions aspiring to higher levels of graduate work will, under pressure of this criterion, proliferate "graduate" courses for which prospective enrollment is prohibitively small. Recently I encountered a situation in which this criterion was carried to its extreme. A college was expanding its courses at the master's degree level and was hoping to offer doctoral programs in the not-too-distant future. In the interest of insuring "excellence" as it is judged by accrediting committees, the graduate council had adopted the following criteria: All the courses for the master's degree would be at the 500 and 600 level. The 500-level courses would be open to "qualified seniors" (not all seniors), and 20 percent of the credit for the master's degree could be earned at this level. The 600-level courses would be closed to all undergraduates, and 80 percent of the credit toward the master's degree would have to be earned in such courses. All the departments at this college are overburdened with the task of preparing 500- and 600-level courses in which enrollments during the foreseeable future will be of the order of 1 to 3 students per course.

JACOB VERDUIN
Botany Department, Southern Illinois University, Carbondale



Hydrogen Bonds → Clean Engines + Dirty Oils

One way to keep an engine clean inside is to keep the oil dirty.

Oil additives—dispersants—help to do this. But how?

Chemists have postulated that one way is through a dispersant's ability to form hydrogen bonds with polar oxidation products—products such as acids and solids that result from cooking the oil and burning the fuel during engine operation. But experimental evidence has been scarce.

Now GM Research has evidence that ashless dispersants of both high and low molecular weight do form hydrogen bonds with polar liquids, tying the polar molecules to the dispersants.

Using alcohols as polar molecules—representing oxidation products—one of our chemical engineers studied the effects of adding various concentrations of two ashless dispersants (an aminoalkenylsuccinimide, with low molecular weight, and a high molecular weight methacrylate-pyrrolidone copolymer).

He monitored the interactions, using infrared spectroscopy . . . and found that hydrogen bonds did form between the dispersants and the hydroxylic hydrogen atoms of the alcohols. In an engine oil, hydrogen bonding apparently enables the dispersants to form protective shrouds around the polar oxidation products, keeping any sludge in the oil, preventing sludge deposition.

We knew that dispersants worked. Now we have a better understanding of how. But that's not the end.

From the new understanding may come a better product . . . and even cleaner engines.

GM

General Motors Research Laboratories
Warren, Michigan 48090

6 May 1966, Volume 152, Number 3723

SCIENCE

Factors Favoring Nuclear Power

Man's increasing requirements for energy have been met largely by enhanced consumption of fossil fuels. This has led to serious problems of air pollution and water pollution. While many sources contribute, some of the worst offenders today are coal-burning installations. These generate sulfur dioxide, fly ash, and carbon dioxide. Moreover, the mining processes often lead to polluted streams and ruined land. In addition, the large-scale burning of fossil fuels raises the specter of runaway climatic changes due to the "greenhouse effect."

For many years it has been clear that atomic energy is destined to be the primary energy source; reserves of fossil fuels are limited. However, until a few years ago, the day seemed distant when nuclear energy would become paramount. As long as electricity could be generated more cheaply from fossil fuel than from the atom, the conventional method would be employed despite the social cost of its unpleasant by-products.

We are now in a new era. Atomic energy has proved relatively safe, reliable, and clean. Radioactive wastes can be contained. The bookkeeping cost of nuclear power has become competitive. This was signaled by the contract for the nuclear power plant at Oyster Creek, New Jersey [*Science* **146**, 721 (1964)]. This plant, to be completed in 1967–68, is expected to deliver power at a cost as low as 3.66 mills per kilowatt-hour. In 1965, after the contract for the Oyster Creek plant had been announced, other utility companies contracted for eight major nuclear power plants, with a total capacity of about 5000 megawatts. This was about one-fifth of the aggregate capacity of all the electrical power plants authorized during the year. In 1966 so far six major nuclear plants have been authorized; they account for about half of the new power capacity. The competitive position of nuclear power is likely to get even better. Enthusiasts have estimated that in very large plants power might be produced for less than 2 mills per kilowatt-hour. In contrast, the lowest foreseeable cost for conventional power is 3 to 4 mills.

The projected low cost for nuclear power seems optimistic. Yet nuclear power is becoming cheaper, and the trend will continue. A solid basis for optimism can be seen in a recently issued annual report of the Atomic Energy Commission.* This two-part report sets forth clearly the manifold U.S. activities in atomic energy. Part of the two documents details progress in matters related to civilian electrical power. A methodical program is making nuclear energy cheaper and safer. Experiments with different kinds of fuel elements are permitting greater allowable burn-up of fissionable material. New methods for reprocessing fuel elements will diminish the cost of this phase of reactor technology. Progress in waste management permits much of the waste to be contained safely as solids, and at less expense.

A continuing effort is being made to guarantee reactor safety. To this end the commission has sponsored a series of studies called SPERT (Special Power Excursion Reactor Test). These tests simulate reactor accidents and include both destructive and nondestructive tests with reactor cores. As a result, effective containment can be designed. Of equal importance are continuing advances in designing automatic safety into reactors.

In the contest between conventional and nuclear power, the balance is shifting rapidly. In a few years most new major planned installations are likely to be nuclear.—PHILIP H. ABELSON

**U.S. Atomic Energy Commission Annual Report to Congress for 1965* and *Supplement* (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.)

tion due to acute occlusion of the internal carotid artery," pathogenetic mechanisms in patients having neurologic complications soon after operation, and the specific recommendations for vascular surgery in cervical arterial occlusive disease.

CLARK H. MILLIKAN
Mayo Clinic,
Rochester, Minnesota

Forthcoming Events

May

15–18. American Inst. of **Chemical Engineers**, 59th annual mtg., Columbus, Ohio. (The Institute, 345 E. 47 St., New York 10017)

16–17. **Plant Growth**, conf., New York, N.Y. (J. F. Frederick, Dodge Chemical Co., Research Labs., 3425 Boston Rd., Bronx, N.Y. 10469)

16–18. **Aerospace Electronics**, 18th natl. conf., Dayton, Ohio. (J. M. Mayer, 4525 Fernbrook St., Kettering, Ohio 45440)

16–18. Society of German **Engineers**, conf., Berlin. (The Society, Postfach 10 250, 4 Düsseldorf 10, Germany)

16–18. Institute of Electrical and Electronics Engineers, Group on **Microwave Theory and Technique**, symp., Palo Alto, Calif. (L. Young, Stanford Research Inst., Menlo Park, Calif. 94025)

16–18. **Power Instrumentation**, 9th natl. symp., Detroit, Mich. (R. C. Austin, Detroit Edison Co., 2000 Second Ave., Detroit 48226)

16–18. American Assoc. for **Thoracic Surgery**, Vancouver, B.C., Canada. (A. Henvey, 311 Carondelet Bldg., 7730 Carondelet Ave., St. Louis, Mo.)

16–19. **Biomedical Sciences Instrumentation**, 4th natl. symp., Anaheim, Calif. (T. B. Weber, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif. 92632)

16–20. American Soc. of **Civil Engineers**, Denver, Colo. (W. H. Wisley, 345 E. 47 St., New York, N.Y. 10017)

16–20. **Disposal of Radioactive Wastes** into the Seas, Oceans, and Surface Waters, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärntnerring, Vienna 1)

16–20. American **Industrial Hygiene** Assoc., Pittsburgh, Pa. (A. D. Hosey, 1014 Broadway, Cincinnati, Ohio 45202)

16–20. **Water Resources Engineering**, conf., American Soc. of Civil Engineers, Denver, Colo. (W. H. Wisley, The Society, 345 E. 47 St., New York 10017)

17–19. **Fast Breeder Reactors**, intern. conf., London, England. (H. C. Dunn, British Nuclear Energy Soc., Risley, Warrington, Lancashire, England)

18–20. **Operations Research** Soc. of America, 29th natl. mtg., Santa Monica, Calif. (J. E. Walsh, System Development Corp., 2500 Colorado Ave., Santa Monica)

18–25. **Warm-Water Pond Fish Culture**, world symp., U.N. Food and Agriculture Organization, Rome, Italy. (T. V. R. Pillay, FAO, Via delle Terme di Caracalla, Rome)

19–20. **Membrane Processes** for Industry, symp., Southern Research Inst., Birmingham, Ala. (J. H. Strickland, SRI, 2000 Ninth Ave. S., Birmingham 35205)

19–21. **Organellogenesis**, regional conf., Soc. for Developmental Biology, Ames, Iowa. (J. M. Arnold, Dept. of Biochemistry and Biophysics, Iowa State Univ., Ames 50010)

19–22. **Exfoliative Cytology**, intern. congr., Rio de Janeiro, Brazil. (E. von Haam, Ohio State Univ., Columbus)

19–22. German Bunsen Soc. for **Physical Chemistry**, 65th general assembly, Freudenstadt. (The Society, Varrentrappstr. 40-42, 6 Frankfurt am Main, West Germany)

20–21. **Surface Physics**, 4th symp., Washington State Univ., Pullman. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman 99163)

20–22. Royal **Astronomical** Soc. of Canada, general assembly, Univ. of Manitoba, Winnipeg. (R. J. Lockhart, Dept. of Mathematics, Univ. of Manitoba, Winnipeg)

20–22. Society for **Experimental Medicine** of the German Democratic Republic, 3rd general conf., Leipzig, East Germany. (Secretariat, The Society, Friedrichstr. 129, Block F, 104 Berlin, East Germany)

21. **Southern Calif. Acad.** of Sciences, annual mtg., California State College, San Diego. (C. Rozaire, The Academy, Los Angeles Museum, Exposition Park, Los Angeles, Calif.)

22–26. Institute of **Food Technologists**, 26th annual mtg., Portland, Ore. (C. L. Willey, 176 W. Adams St., Chicago, Ill.)

22–26. American **Orthopedic** Assoc., Colorado Springs, Colo. (S. W. Banks, 29 E. Madison St., Chicago, Ill.)

23–24. **High Temperature Reactors** and the Dragon Project, symp., London, England. (Secretary, British Nuclear Energy Soc., Inst. of Civil Engineers, 1-7 Great George St., London S.W.1)

23–25. American **Astronautical** Soc., 12th annual mtg., Los Angeles and Anaheim, Calif. (L. Larmore, Douglas Aircraft, 3000 Ocean Park Blvd., Santa Monica, Calif.)

23–25. **Chemical and Petroleum Instrumentation**, 7th natl. symp., San Francisco, Calif. (J. T. Ward, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

23–25. Dynamics of **Chemical Reactions**, intern. symp., Padua, Italy. (Direzione Istituto di Impianti Chimici, Univ. degli Studi, Padua)

23–26. Association for Research into **Periodontal Disease**, 18th mtg., West Berlin, Germany. (M. J. Matthey, 2 rue Bartholini, Geneva, Switzerland)

23–26. **Spaceflight**, 6th European symp., Brighton, England. (British Interplanetary Soc., 12 Bessborough Gardens, S.W., London, S.W.1, England)

23–28. International Assoc. for the Study of the **Bronchi**, 16th congr., Athens, Greece. (The Association, 189 Blvd. St.-Germain, Paris 7, France)

23–28. **Hormonal Steroids**, intern. congr., Milan, Italy. (L. Martini, Inst. di Farmacologia, Via Andrea del Sarto 21, Milan)

24–26. **Solid Propulsion**, conf., Chicago, Ill. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

24–26. **Ultrasonic Testing** of Materials, 2nd intern. symp., Berlin, Germany. (Kammer der Technik FV "Maschinenbau," Clara-Zetkinstr. 115-117, 108 Berlin)

25. American Soc. for **Gastrointestinal Endoscopy**, Chicago, Ill. (B. H. Sullivan, Jr., 2020 E. 93 St., Cleveland, Ohio 44106)

25–27. Society of **Radiographers**, 20th annual conf., Brighton, England. (The Society, 32 Welbeck St., London, W.1, England)

25–27. **Sulfamic Acid** and Its Electrometallurgical Applications, symp., Milan, Italy. (R. Piontelli, Laboratorio di Electrochimica, Clinica-Fisica e Metallurgia del Politecnico di Milano, 32 Piazza Leonardo da Vinci, Milan)

26–27. **Fiber** Soc., spring mtg., Williamsburg, Va. (L. Rebenfeld, The Society, Textile Research Inst., P.O. Box 625, Princeton, N.J.)

26–28. American Assoc. for **Cancer Research**, annual mtg., Denver, Colo. (H. J. Creech, 7701 Burholme Ave., Philadelphia, Pa. 19111)

26–28. American **Gastroenterological** Assoc., Chicago, Ill. (D. Cayer, 2240 Cloverdale Ave., Winston-Salem, N.C.)

26–28. American Inst. of **Industrial Engineers**, 17th annual conf. and conv., San Francisco, Calif. (S. G. McIntyre, 5 Heather Lane, Hillsborough, Calif.)

28–6. **Sea**, 2nd intern, congr., Treboul-Douarnenez, France. (Federation Thermale et Climatique, 6, rue Lafayette, Rennes, Ile-et-Vilaine, France)

29–2. **Special Libraries** Assoc., annual conv., Minneapolis, Minn. (G. Aspnes, Cargill, Inc., Minneapolis 55402)

30–1. Canadian **Nuclear** Assoc., intern. congr., Winnipeg. (R. F. Gross, The Association, 19 Richmond St., W., Toronto 1, Ont.)

30–1. American **Ophthalmological** Soc., White Sulphur Springs, W. Va. (S. D. McPherson, Jr., 1110 W. Main St., Durham, N.C.)

30–1. **Organic and Heavy Water Reactors and Radioisotopes**, intern. conf., Canadian Nuclear Soc., Winnipeg, Man. (R. F. Gross, 19 Richmond St. W., Toronto, Ont.)

30–2. Recent Advances in **Atherosclerosis**, intern. symp., Univ. of Athens, Athens, Greece. (A. N. Howard, Dept. of Pathology, Univ. of Cambridge, Tennis Court Rd., Cambridge, England)

30–4. **Electron Microscopy and Cytochemistry**, intern. symp., Leiden, Netherlands. (W. Th. Daems, Laboratory for Electron Microscopy, 62, Wassenaarsewge, Leiden)

30–9. **Oceanography**, 2nd intern. congr., Moscow, U.S.S.R. (A. P. Vinogradov, Acad. of Sciences of the U.S.S.R., Moscow)

31–2. **Tissue Culture** Assoc., annual mtg., San Francisco, Calif. (D. C. Hetherington, Duke Univ. Hospital, Durham, N.C.)

31–3. Society of **Physical Chemistry**, 16th annual mtg., Paris, France. (G. Emschwiller, The Society, 10, rue Vanquelin, Paris 5)

30–9. **Oceanography**, intern. conf., Moscow, U.S.S.R. (R. C. Vetter, Committee on Oceanography, Natl. Acad. of Sciences, 2101 Constitution Ave., Washington, D.C., 20418)