SCIENCE

22 December 1967

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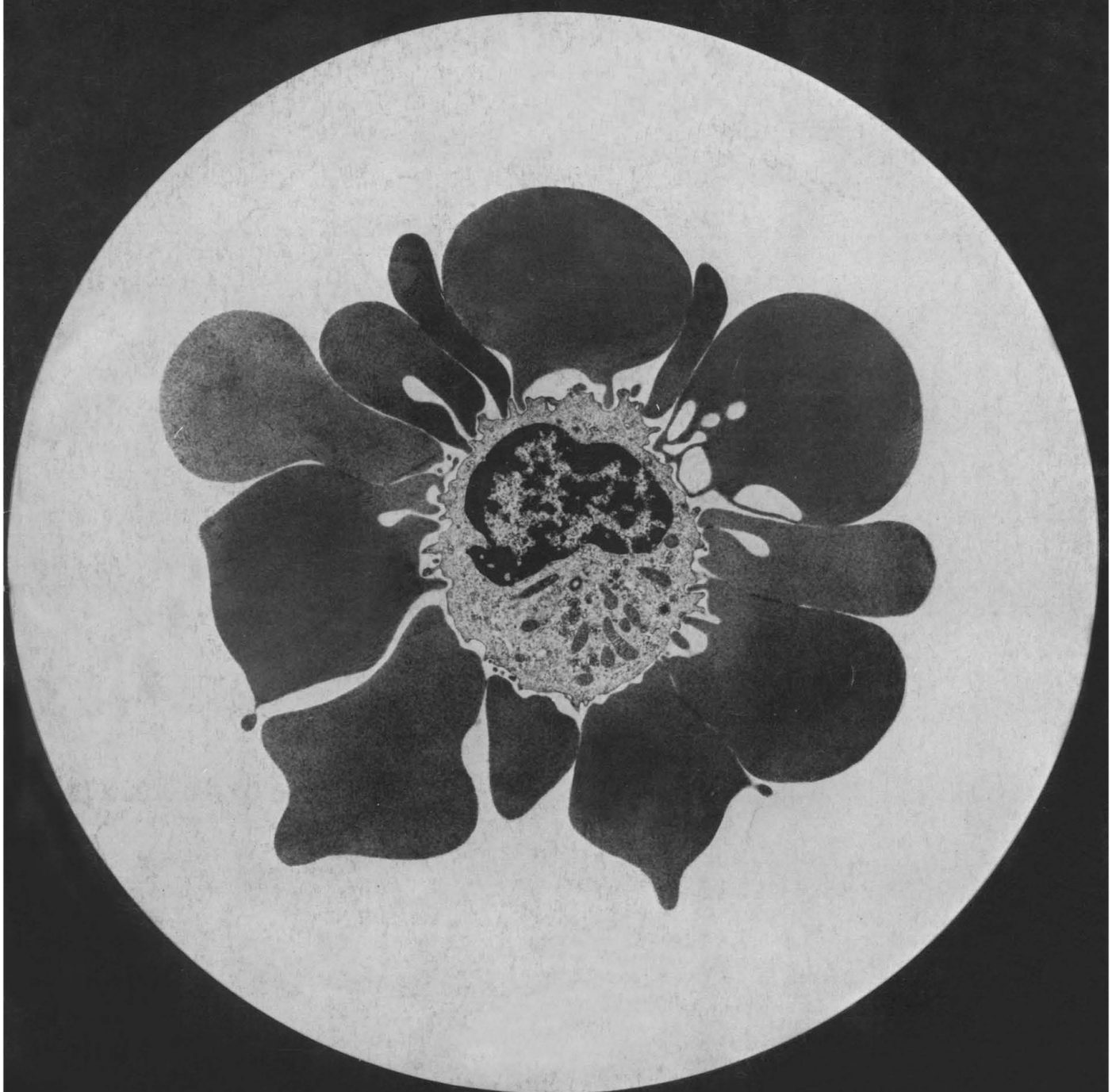
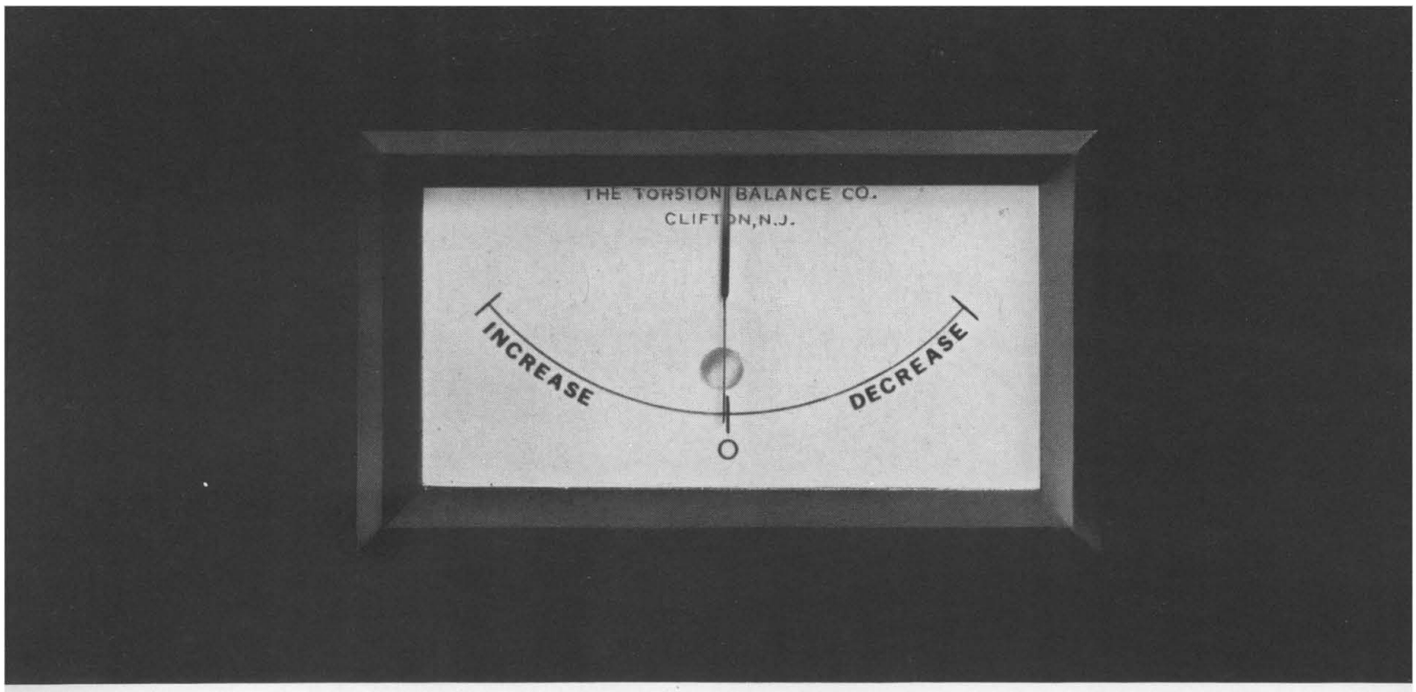
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



RED CELLS



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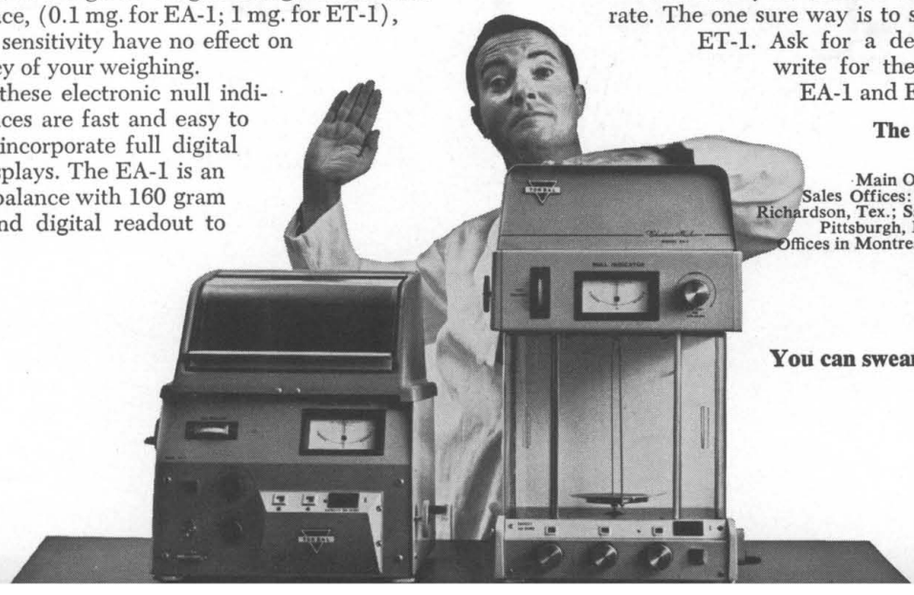

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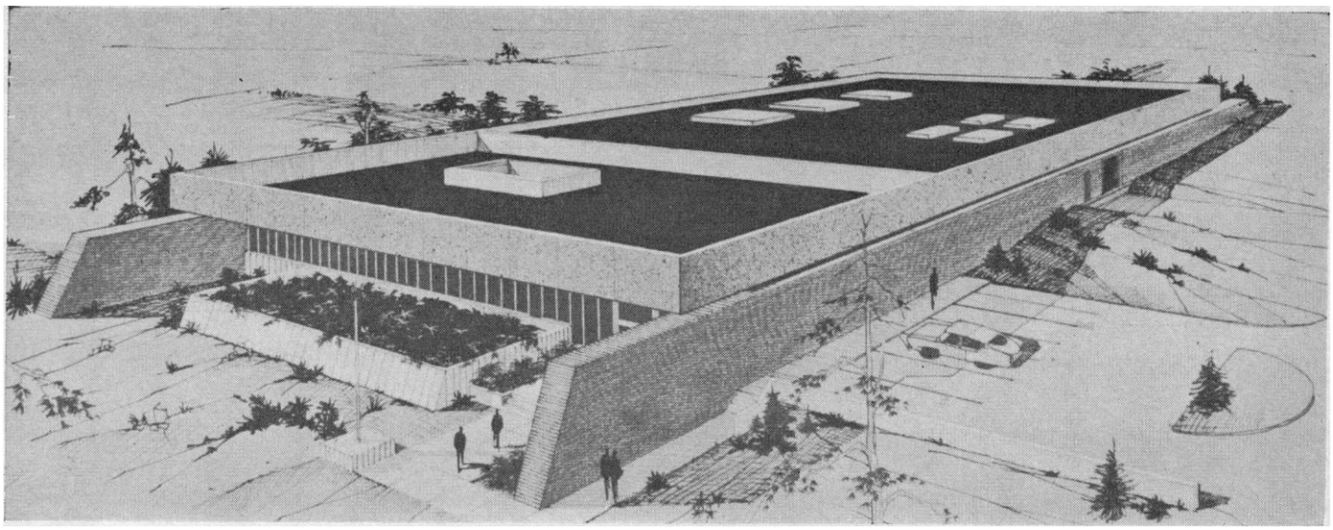

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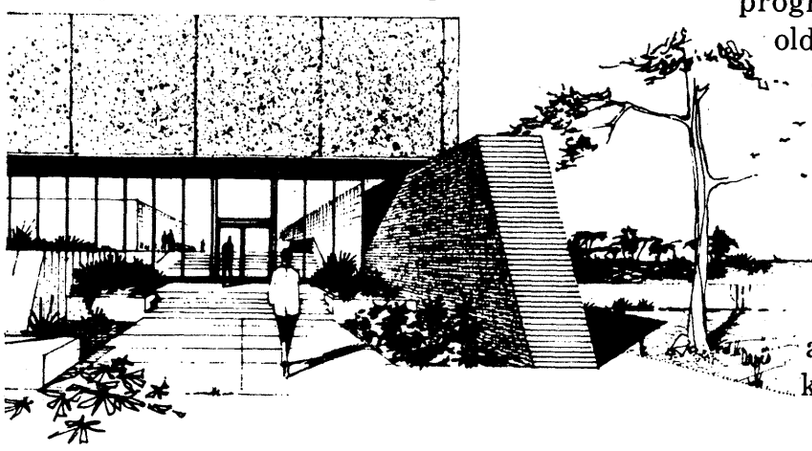

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Rosette pattern created by red cells coated with antibodies and adhering to a human mononuclear cell. Receptors on monocytes, macrophages, and certain lymphocytes specifically bind a particular portion (the Fc-fragment) of immunoglobulin G molecules attached to the surface of red cells. The entrapped red cells are spheroidal and deformed but do not necessarily undergo phagocytosis (about × 9300). See page 1582. [A. F. LoBuglio, R. S. Cotran, and J. H. Jandl, Harvard Medical School]

Recent AAAS Symposium Volumes

#87. **Formulation of Research Policies**

1967. 218 pages. Editors: Lawrence W. Bass and Bruce S. Old. Collected papers from a Gordon Research Conference held in Santa Barbara, California, in 1966. Goals, accomplishments—and weaknesses—of past and present science policies of nations, government agencies, individual industries, and international organizations are given expert and candid appraisal in this work—the record of an exciting conference.

Price: $7.75. *AAAS Member's Cash Price:* $6.75.

#84. **Molecular Mechanisms of Temperature Adaptation**

1967. 398 pages. Editor: C. Ladd Prosser. A collection of papers on the general physiology of temperature adaptation in cold-blooded animals, plants, and microorganisms.

Price: $12.50. *AAAS Member's Cash Price:* $10.50.

#83. **Estuaries**

1967. 776 pages. Editor: George H. Lauff. The first comprehensive collection of scientific papers covering the comparatively new field of estuarine research.

Price: $27.00. *AAAS Member's Cash Price:* $24.00.

#82. **Civil Defense**

1966. 154 pages, paper. Editor: Henry Eyring. Scientists report their findings on problems related to modern warfare and passive civil defense systems.

Price: $4.00. *AAAS Member's Cash Price:* $3.50.

#81. **Environmental Variables in Oral Disease**

1966. 328 pages. Editors: S. J. Kreshover and F. J. McClure. Contents: Geographical and clinical considerations; the oral environment—nutrition and dental caries; experimental considerations in oral soft lesions; prenatally occurring influences.

Price: $8.75. *AAAS Member's Cash Price:* $7.75.

#80. **Air Conservation**

1965. 348 pages. "The result of a 2-year study by the AAAS Air Conservation Commission, all aspects–sociological, technical, political and biological—of air pollution are considered concisely." (*Chemical Processing for Operating Management*, May 1966)

Price: $8.00. *AAAS Member's Cash Price:* $7.00.

#79. **Science in Japan**

1965. 496 pages. Editor: Arthur H. Livermore. A broad and detailed review of recent scientific and technological developments in Japan.

Price: $13.00. *AAAS Member's Cash Price:* $11.00.

#78. **Man, Culture, and Animals**

1965. 304 pages. Editors: Anthony Leeds and Andrew P. Vayda. "This volume contains articles pertaining to the relationship between man and animals in different parts of the world, covering the influence of domesticated and non–domesticated animals on a variety of cultures." (*Biological Abstracts*, 1 February 1966)

Price: $8.00. *AAAS Member's Cash Price:* $7.00.

#77. **Food Quality**

1965. 306 pages. Editors: George W. Irving, Jr., and Sam R. Hoover. "It is an excellent, well-edited review of the agronomical production and processing problems of the basic commodities, fruits and vegetables, cereals, dairy products, poultry and eggs, and meat products." (*Cereal Science Today*, November 1965)

Price: $8.50. *AAAS Member's Cash Price:* $7.50.

#76. **Agricultural Sciences for the Developing Nations**

1964. 230 pages. Editor: Albert H. Moseman. "The book . . . is especially useful because of the author's combined experience with the situations and problems of agriculture in the less developed countries. . . . This book will be a valuable reference for many years." (*BioScience*, March 1966)

Price: $6.75. *AAAS Member's Cash Price:* $6.00.

#75. **Mechanisms of Hard Tissue Destruction**

1963. 776 pages, 430 illustrations. Editor: R. F. Sognnaes. "Scientists in the fields of dentistry, medicine, and zoology presented a multidisciplinary symposium in 1962, dealing with varied but cognate topics such as coral reefs, dental caries, deer antlers, osteoclastic diseases, bone metabolism, chelation. It is a refreshingly well-planned, well-edited, and interesting symposium." (*Journal of the American Medical Association*, July 1964)

Price: $13.00. *AAAS Member's Cash Price:* $11.00.

#74. **Aridity and Man**

1963; 2nd printing, 1965. 604 pages, 98 illustrations. Editors: Carle Hodge and Peter C. Duisberg. "Best collection of background material . . . well balanced and highly readable . . . probably the broadest and most nearly complete treatment of arid lands yet published." (*Journal of Forestry*, May 1964)

Price: $12.00. *AAAS Member's Cash Price:* $10.00.

72. **Spermatozoan Motility**

1962. 322 pages, 113 illustrations. Editor: David W. Bishop. "This book is an excellent assemblage of recent findings and reports of new data relative to the perplexing problem of sperm motility and includes the opinions and ideas of cytologists, biophysicists, biochemists and physiologists." (*Journal of Animal Sciences*, March 1963)

Price: $7.50. *AAAS Member's Cash Price:* $6.50.

#67. **Oceanography**

1961; 4th printing, 1966. 665 pages, 146 illustrations. Editor: Mary Sears. "*Oceanography* is a milestone in oceanographic advance, a worthy publication to come out of the first international congress of its kind." (*Geographical Review*, Vol. 52, No. 3)

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The hope of doing each other some good prompts these advertisements

The moon job

Since Americans have known us all their lives by a product that looks toylike in its simplicity and is brought into play on fun-filled occasions, we are often regarded as a toy manufacturer. We withhold protest.

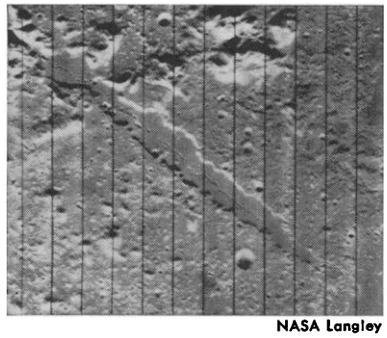
In a series of five papers in the *Journal of the Society of Motion Picture and Television Engineers* (August '67), we wind up the record on another toy. It came in two parts. One part rode in circumlunar orbit, taking image-motion-compensated pictures on conventional film, processing them in—of all things—an aqueous medium, and translating the film image into a video signal. The second part remained behind on earth and translated the signal from the time dimension back into the two spatial ones customary in all the other millions of pictures turned out each day on Kodak film and paper. As expected of any Kodak photographic system, this one did its job. In five out of five trips it proved it could picture at the will of the operator anything anywhere on the lunar surface bigger than a card table.

Now what was the good of it all?

The 35th President of the United States set a national goal of planting an American foot on the moon during this decade. Voters remembered about Balboa's foot on the Pacific beach and Peary's at the North Pole. The project became comprehensible.

As an essential preliminary, the five Lunar Orbiters spelled out in full the choice of landing sites. The entire earthward face of the moon is now mapped in 10 to 100 times the detail of before. About the entire backside more detail is now recorded than about much of the staid old earth that man's foot has long trod.

With the needs of the men of action thus seen to, a handsome payoff was still left for the thoughtful side of the human spirit. The founders of civilization millenia ago considered the origin of the earth and moon an important subject. Enjoying easier times, we ought to consider it all the more worthy of attention.



NASA Langley

• This sinuous lunar rill northeast of Mare Imbrium looks like a river. In this picture may be found evidence either for or against a flowing medium. Defenders of either view must wind up wiser about the structure of planetary bodies.

• Mounds our equipment photographed near the crater Marius require explanation.

• The photographs of the region of Aristarchus, where earlier observers at telescopes reported smoke or luminescence, may reveal signs of moonquakes, which would call for a moon capable of quaking.

• Hexagonal craters that appear in some of the photography suggest a three-way lunar substructure. A simpler explanation would be welcome.

• The absence of maria from the backside is obviously telling us something about the relation of the earth to the mechanism of mare formation. If obvious, what's the message?

One good from our lunar endeavors: those who set foot on the moon won't be bored for lack of things to investigate.

The education market

We know a very real and alert young citizen from the center of our city who can scarcely read the simplest words, though she is almost 9. It comes so hard because in the lives of the parents she loves and who surely love her, reading and writing play hardly any part. That leaves only school to give these capabilities interest and importance. Philosophical argument won't sway Helen but something had better work.

Some 80 kids from Helen's part of town are bussed 20 miles east each morning to join the other pupils in the Demonstration School of State University College at Brockport. The Demonstration School serves its usual functions in a teacher-training institution and is furthermore examining approaches to prepare suburban educators for integrated education. Troubles with reading as bad as Helen's can turn up in college faculty offspring, even if differently caused.

An office in the Demonstration School is occupied this academic year by a man who is on the payroll not of the State University of New York but of the Kodak Research Laboratories, which have been concentrating for the past 55 years almost exclusively on the application of chemistry and physics to photography. It is a strange move on our part, isn't it? The man has been instructed to observe new educational concepts at work and find projects where Kodak's resources might be further utilized in solving the present-day problems of education. We hope he finds some.

* * * * *

Two other men from the Kodak Research Laboratories have successfully completed a more familiar and easier project. To the same society that has published our Lunar Orbiter papers (*see left*) they have announced discovery of a new screen material that makes projected images at least six times brighter than screens currently available. Remarkable changes can be effected in the microstructure of certain sheet aluminum alloys to deliver the high reflectance only in the solid angle wanted.

* * * * *

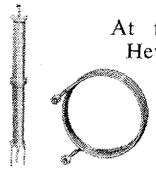
An ad that has just appeared in a teachers' magazine says ". . . Brighter than you can imagine. We call it the KODAK Projection SUNSCREEN. Leave room lights on, windows uncovered, and still watch sharp, bright movies. There'll be no more squirming and giggles in the dark. This high-intensity screen makes both color and black-and-white movies absolutely brilliant. It's built into the cover of every KODAK EKTAGRAPHIC 8 and Sound 8 Projector. For details, write for Bulletins V3-8 and V3-9 [to Eastman Kodak Company, Motion Picture and Education Markets Division, Rochester, N.Y. 14650]."

* * * * *

The question still remains: will Helen learn to care about the difference between "MEAT" and "BEAT"?

A close look at the pill and other molecules ...with effective instruments

The Art of Making Fine Chemicals



At the 1965 Pittsburgh Conference, Hewlett-Packard introduced to the chemical industry a large-scale preparative gas chromatograph. Where prep GC had previously been limited to producing, at best, a few *milliliters* of high-purity chemicals during a long day's operation, this new H-P instrument easily separated a *liter* of equally pure materials in a few hours.

As is often the case with technological advancements that suggest a commercial value, incredulity ensued—partly because claims about the instrument were misunderstood, partly because the largest element of the scientific community is from Missouri. Large-scale prep GC became one of 1965's chemical controversies. Yet today, a scant 3 years later, H-P's large-scale prep GC is a fixture in scores of chemical companies around the world, on the basis of its *demonstrated* rather than claimed capabilities.

The characteristic elements of the H-P instrument are the 4-inch diameter column whose relative capacity ratio is more than 100 times greater than conventional prep columns; and the flow homogenizer, an ingenious piece of hardware that removed the last barrier to the use of such large columns, i.e., non-uniform carrier gas flow leading to loss of resolution. Because of these two elements, the instrument has a gargantuan appetite for performing high-purity separations. For example, it separated a gallon of rectified turpentine (that's almost 4 liters) into 1733 milliliters of α-pinene, 701 milliliters of β-pinene, both with a purity of over 98%; instrument running time was 30 hours. In a 7-hour run, the instrument separated 970 milliliters of C_8, C_9 and C_{10} methyl esters, collecting 906 milliliters in the following purities: C_8 and C_{10}, 99.8%; C_9, 99.2%. The same work would have taken 6 months on a conventional prep GC.

Based on these and many similar separations, the importance to the chemist of the H-P prep GC is easily described: it produces high-purity chemicals so fast, so conveniently, and so economically that every chemist who needs them—analytical, organic, biomedical—can now prepare his own, whether he needs a microliter or several liters of a pure substance . . . for use in reaction studies, for analysis, or even for commercial purposes. Of course if all three types of chemists work in the same lab, the H-P prep GC also creates a new problem: who gets to use it first. For help in solving most prep GC problems except this one, write for Data Sheet 775/6.

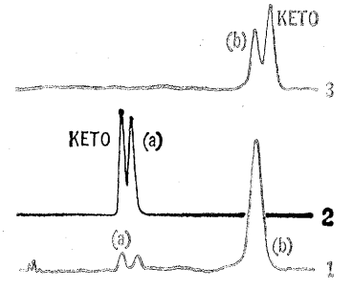
Pandora's Pill Box

Although five to seven million American women have already consumed more than four billion oral contraceptives, there is still much uncertainty concerning their long-term effect on the human body.

The issues are scientific and the questions involve chemistry, biochemistry and physiology . . . endocrinology, pharmacology, and gynecology. The answers are in widespread research in every scientific discipline concerned.

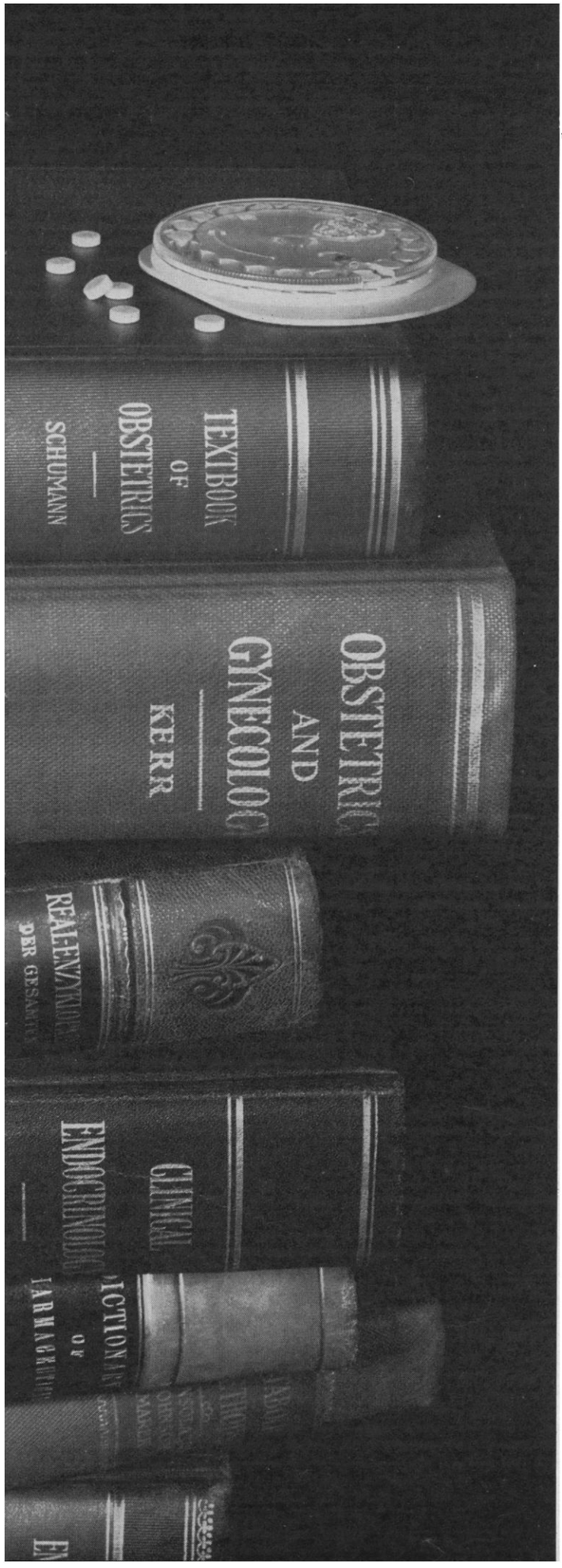
It is in the chemical and biochemical disciplines that Hewlett-Packard assumes its concern with the massive anti-fertility drug research program, specifically, through its Gas Chromatography Applications Laboratory, in Avondale, Pa. Thus far, Avondale's involvement has centered around two of the most widely used synthetic hormones: *Norethindrone* and *Mestranol*. Both are labile steroids, subject to thermal degradation. When these steroids break down—whether during manufacture, in the human environment, or during analysis—they form a keto analog so similar in chemical structure to the original molecule that it is extremely difficult to differentiate one from the other. The rub is that the scientist *must* be able to tell them apart since the steroid is an effective anti-fertility agent while the keto analog is not.

Thus there can be no confidence in any chemical analysis of the pill unless it is first demonstrated that the analytical procedure can separate the steroid from its keto analog . . . and that it can preserve the chemical integrity of the two types of molecules during the analysis.



As far back as 1964, our application chemists proved that the Model 402 High-Efficiency Gas Chromatograph has both capabilities. The proof is presented here in the form of three chromatograms. The first, an analysis of a sample containing the two steroids, shows the presence of *Norethindrone* (b) and *Mestranol* (a), and the absence of their keto analogs: this is proof that the 402 respects the chemical integrity of the steroids. If the Model 402 were causing degradation of the steroids, the chromatogram would show the presence of at least some quantity of the keto analogs. The second chromatogram shows the presence of both the steroid *Mestranol* and its keto analog, thus demonstrating the 402's ability to separate one from the other when the two coexist in a sample. The same is true of the third chromatogram, this time with respect to *Norethindrone*.

Lest it become obscure at this point, the noteworthiness of these analyses is twofold: they demonstrate the 402's ability to detect the labile steroids used in anti-fertility drugs without causing degradation during the analytical procedure; and its ability to separate compound pairs of such steroids one from the other and from their keto analogs. Extrapolating from these points, the 402 can be seen as a fast means for quality control in anti-fertility drug preparation, as the basis for investigation of its clinical progress and beyond that as a possible means for *in vivo* patient monitoring. A report of the anti-fertility drug analysis as it was originally presented in *Facts & Methods,* Vol. 5 No. 3, is available on request.



Molecules and Microwaves

Most new laboratory instruments are developed to satisfy a demand, usually at the same time the demand occurs. On rare occasions, an instrument whose unique capabilities promise to advance the state-of-the-art in a particular branch of science makes an appearance so far ahead of a clear demand for it that its immediate commercial value can be questioned.

Precisely such an instrument is the Hewlett-Packard Model 8400B Microwave Spectrometer. It fits all descriptions of a technological and scientific breakthrough, although it is much closer to home in the area of current and useful application than the preceding discourse might indicate.

In simplest operational terms, the Microwave Spectrometer looks into the molecular structure of a compound by measuring its absorption frequencies during an X, R, or K band sweep. It makes molecular determinations by using the microwave to measure changes in *rotational* energy levels in a molecule. Because differences exist in the geometry of individual molecular species, the microwave spectrum for an individual molecule is characteristic for that species. A logical objection, if you're up on your species, is that most compounds would present a tremendous number of absorption peaks. True. But with the 8400B it is relatively easy to differentiate spectra of two different species because of the inherent high resolution of microwave spectroscopy, in conjunction with an accurate means of measuring microwave frequencies.

In terms of its application, the Microwave Spectrometer provides a means of measuring the total amount of information available from gas-phase microwave spectroscopy absorption lines—frequency, intensity, line width or relaxation rates. This, in turn, permits researchers to delve into such areas as molecule identification, molecular concentration, bond distance, bond angle, molecular vibrational levels, barriers hindering internal rotation, equilibrium constants, molecular collision rates, and reaction kinetics.

Precisely where the Microwave Spectrometer fits into the pattern of modern chemistry is still being studied, but early indications show it may well establish patterns of its own. Based on a recent experiment it has already carved one niche—and an important field of study for the microwave spectroscopist—in the detection and quantitative determination of components in a complex, gaseous, molecular mixture differing only in isotopic composition. (The experiment was to determine the relative concentration of $C^{13}H_3C^{13}CH$ to $C^{13}H_3CC^{13}H$ in C^{13} enriched methyl acetylene.) Such experiments are published as regularly as they occur in H-P's newest publication, *Molecules and Microwaves,* a copy of which awaits your request to Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. Europe: 54 Route des Acacias, Geneva.

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ANALYTICAL INSTRUMENTS

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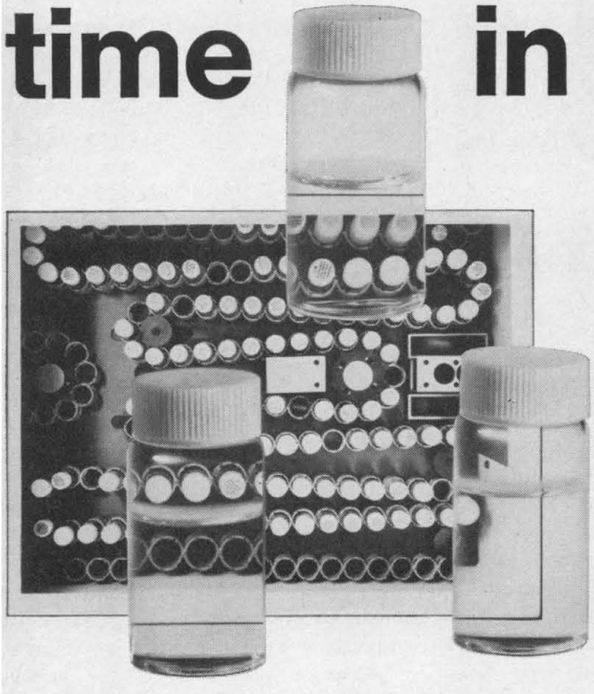

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22 December 1967, Volume 158, Number 3808

SCIENCE

A Damaging Source of Air Pollution

Public concern about air pollution has grown rapidly during the past few years. In a recent poll, 80 percent of respondents felt that additional measures should be taken to minimize this problem. Most people, when they consider air pollution, think of the automobile, the smokestack, or the trash burner. Few point to a most damaging source of air pollution—the cigarette.

One of the toxic products of the automobile is carbon monoxide. Exposure for 1 hour to a concentration of this gas of 120 parts per million causes inactivation of about 5 percent of the body's hemoglobin and commonly leads to dizziness, headache, and lassitude. Concentrations of carbon monoxide as high as 100 ppm often occur in garages, in tunnels, and behind automobiles. Such concentrations are tiny in comparison with those (42,000 ppm) found in cigarette smoke. The smoker survives because most of the time he breathes air not so heavily polluted. However, in a poorly ventilated, smoke-filled room, concentrations of carbon monoxide can easily reach several hundred parts per million, thus exposing smokers and nonsmokers present to a toxic hazard.

Another air pollutant issuing from automobiles is nitrogen dioxide. Nitrogen dioxide is an acutely irritating gas; also, it gives rise to nitrite, a potential mutagenic agent. Concentrations of NO_2 as high as 3 ppm have been noted in Los Angeles, and levels of 5 ppm are considered dangerous. Cigarette smoke contains 250 parts of NO_2 per million.

Many of the toxic agents in cigarette smoke do not have counterparts in ordinary air pollution. One of these, hydrogen cyanide, is particularly noteworthy. It is highly active against respiratory enzymes. Long-term exposure to levels above 10 ppm is dangerous. The concentration in cigarette smoke is 1600 ppm.

These inorganic pollutants are three of many noxious substances that have been found in tobacco smoke. Among others are acrolein, aldehydes, phenols, and carcinogens, an important one of which is benzo(*a*)pyrene. Evidence points to synergistic effects among the toxic agents. The phenols, though not themselves notably carcinogenic, increase markedly the carcinogenic potency of benzo(*a*)pyrene.

The toxic effects of cigarette smoke are also enhanced by other environmental factors. A recent study of asbestos workers showed a very high incidence of lung cancer among smokers, in contrast to a low incidence among nonsmokers. In a group of 283 asbestos workers who had a history of cigarette smoking, 24 of 78 deaths were due to bronchogenic carcinoma. Of 87 asbestos workers who were nonsmokers, none died of lung cancer during a comparable period. A study of the uranium miners stricken with lung cancer has also revealed an effect related to smoking. The rate of fatalities was much higher among smokers than among nonsmokers.

Another example of a synergistic effect is seen in the smoker who breathes polluted urban air. The incidence of lung cancer among smokers is higher in the city than in rural areas.

The principal effects of smoking are borne by the smokers themselves. They pay for their habit with chronic disease and shortened life. Involved are the individual's decision and his life. However, when the individual smokes in a poorly ventilated space in the presence of others, he infringes the rights of others and becomes a serious contributor to air pollution.—PHILIP H. ABELSON

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8–12. Automotive **Engineering** Congr. and Exposition, Detroit, Mich. (W. I. Marble, Soc. of Automotive Engineers, Meetings Div., 485 Lexington Ave., New York 10017)

9–11. **Chemical Marketing**, Hopatcong, N.J. (Saul Gordon Associates Center for Professional Advancement, P.O. Box 66, Hopatcong 07843)

10–13. National Soc. of **Professional Engineers**, winter mtg., Washington, D.C. (P. H. Robbins, NSPE, 2029 K Street NW, Washington, D.C. 20006)

11–12. Wires for **Electrical Conductors**, Philadelphia, Pa. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia 19103)

14–18. Society for **Cryo-Ophthalmologists**, Miami Beach, Fla. (J. G. Bellows, Executive Sceretary, 30 N. Michigan Ave., Chicago, Ill. 60602)

15–16. **Medical Library** Board, Washington, D.C. (Medical Library Assoc., Inc., 919 N. Michigan Avenue, Chicago, Ill.)

15–17. **Noise Measurement and Control**, Hopatcong, N.J. (Saul Gordon Associates Center for Professional Advancement, P.O. Box 66, Hopatcong 07843)

15–17. **Paint, Varnish, Lacquer**, and Related Products, Cincinnati, Ohio. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103)

15–17. Use of **Data Mechanization and Computers in Clinical Medicine**, New York, N.Y. (E. R. Gabrieli, Director, Clinical Information Center, SUNY, Buffalo, N.Y. 14215)

15–18. **Environmental Sciences** Research Symp. (Solid Waste Disposal, Air Pollution, Agricultural Pollutants, Water Quality, Corrosion), New Orleans, La. (E. Klein, Director, Physical Chemistry, P.O. Box 26500, New Orleans 70126)

16–18. **Reliability** Symp., Boston, Mass. (V. R. Monshaw, Astro-Electronics Div., RCA, Box 800, Princeton, N.J. 09540)

17–19. **Nuclear Medicine**, postgraduate symp., St. Louis, Mo. (E. J. Potchen, Washington Univ. School of Medicine, St. Louis, Mo. 63110)

17–19. **Process Industries**, instrumentation symp., College Station, Tex. (R. G. Anthony, Texas A&M Univ., College Station)

18–20. **Pediatrics**: Diagnosis and Treatment of Disorders of Perception, Speech and Learning, Gainesville, Fla. (Division of Postgraduate Education, P.O. Box 746, J. Hillis Miller Health Center, Gainesville 32601)

19–20. American **Rheumatism** Assoc., mtg., Baltimore, Md. (M. M. Walsh, ARA Headquarters, 1212 Ave. of the Americas, New York 10036)

19–20. American Soc. for **Surgery of the Hand**, annual mtg., Chicago, Ill. (R. M. Curtis, The Society, 2947 St. Paul St., Baltimore, Md. 21218)

19–20. **Blood**, 16th annual symp., Detroit, Mich. (W. H. Seegers, Chairman, Dept. of Physiology and Pharmacology, Wayne State Univ. College of Medicine, Detroit 48207)

20–25. American Academy of **Orthopaedic Surgeons**, annual mtg., Chicago, Ill. (J. K. Hart, AAOS, 29 E. Madison, Chicago 60602)

22–23. **Industrial Research**, 3rd annual, Chicago, Ill. (V. H. Disney, IIT Research Inst., 10 W. 35 St., Chicago 60616)

22–24. **Aerospace** Sciences mtg., New York, N.Y. (Meetings Manager, American Inst. of Aeronautics and Astronautics, 1290 Ave. of the Americas, New York 10019)

22–24. **Coal and Coke**, Philadelphia, Pa. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia 19103)

22–24. **Radioisotopes and Radiation Effects**, New Orleans, La. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103)

22–26. **Basic Electronics**, Hopatcong, N.J. (Saul Gordon Associates Center for Professional Advancement, P.O. Box 66, Hopatcong 07843)

22–26. **Marine Sciences Instrumentation,** 4th natl. symp., Cocoa Beach, Fla. (M. Reed, Instrument Soc. of America, 530 William Penn Pl., Pittsburgh, Pa. 15219)

22–26. **Powder X-Ray Diffractometry**, Austin, Tex. (D. E. Griffith, Program Director, Taylor Hall 153, College of Engineering, University of Texas, Austin 78712)

22–27. **Air Conditioning** Principles and Practices, Austin, Tex. (D. E. Griffith, Program Director, Taylor Hall 153, College of Engineering, University of Texas, Austin 78712)

23. **Industrial Associates** Research Review, Houston, Tex. (D. E. Griffith, Program Director, Taylor Hall 153, College of Engineering, University of Texas, Austin 78712)

23. Preventive and Therapeutic Aspects of **Coronary Heart Disease**, conf., New York, N.Y. (Conference Planning Committee, New York Heart Association, 10 Columbus Circle, New York 10019)

23–26. Council on **Social Work Education**, Minneapolis, Minn. (P. Stickney, Council on Social Work Education, 345 E. 46 St., New York 10017)

23–26. **Water**, Technical Committee mtg., West Palm Beach, Fla. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103)

23–27. American Mathematical Soc., 74th annual, San Francisco, Calif. (G. L. Walker, American Mathematical Soc., Box 6248, Providence, R.I. 02904)

24–25. **Health Physics**, 2nd mid-year symp., Augusta, Ga. (C. M. Patterson, E. I. duPont, Savannah River Lab., Aiken, S.C. 29801)

25–27. **Mathematical** Assoc. of America, 51st annual, San Francisco, Calif. (H. M. Gehman, MAA, Executive Director, c/o SUNY at Buffalo, N.Y. 14214)

25–27. **Symmetry Principles** at High Energy, 4th conf., Coral Gables, Fla. (Conf. on Symmetry Principles at High Energy, Center for Theoretical Studies, University of Miami, Coral Gables)

27–1. American Group **Psychotherapy** Assoc., conf., Chicago, Ill. (M. Schiff, AGPA, Room 702, 1790 Broadway, New York 10019)

28. Fourth **Mössbauer** Symp., Chicago, Ill. (P. A. McNulty, New England Nuclear Corp., 575 Albany St., Boston, Mass. 02118)