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28 November 1975

Volume 190, No. 4217

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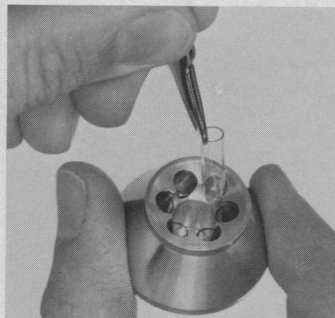


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Volume 190, No. 4217

SCIENCE

LETTERS	Research and Public Funds: <i>S. Garb</i> ; Are the Data Worth Owning?: <i>W. D. Compton</i> ; Investment in Research: <i>W. T. Knox</i> ; Black Ph.D.'s: <i>J. M. Jay</i> ; Interdisciplinary Misunderstanding: <i>M. E. Sarty</i> ; Erratum	834
EDITORIAL	Mutatis Mutandis: Congress, Science, and Law: <i>J. W. Curlin</i>	839
ARTICLES	Bringing the Green Revolution to the Shifting Cultivator: <i>D. J. Greenland</i>	841
	Exploratory Journey out of the Ecliptic Plane: <i>D. E. Page</i>	845
	Determination of Molecular Conformation in Solution: <i>M. R. Willcott, III</i> and <i>R. E. Davis</i>	850
NEWS AND COMMENT	Caucus of Labor Committees: Radicals with Their Own Edge on Truth	857
	Surprise Appointments Restore Science to White House Favor	859
	Military Medical School: It Survives Despite All Efforts to Kill It	860
	Hazel Henderson: Nudging Society off Its Macho Trip	862
RESEARCH NEWS	Marihuana: New Support for Immune and Reproductive Hazards	865
	The 1975 Nobel Prize in Physics: <i>H. Feshbach</i>	868
	Malodor Counteractants: The Nose No Longer Knows.	870
ANNUAL MEETING	Tours and Special Events	871
BOOK REVIEWS	Female of the Species, reviewed by <i>J. Shapiro</i> ; Physics and Mathematics of the Nervous System, <i>D. Marr</i> ; Circannual Clocks, <i>S. Binkley</i> ; Surtsey, <i>J. A. Downes</i> ; Diffusion in Solids, <i>F. Seitz</i> ; Interaction between Ions and Molecules, <i>F. Kaufman</i> ; Books Received.	874
REPORTS	Fuel Formation from Aqueous Ferric Bromide by Photolysis in the Visible: <i>S.-N. Chen, N. N. Lichtin, G. Stein</i>	879
	Shanidar IV, a Neanderthal Flower Burial in Northern Iraq: <i>R. S. Solecki</i>	880
	Atmospheric Concentrations and Inventory of Krypton-85 in 1973: <i>K. Telegadas</i> and <i>G. J. Ferber</i>	882

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Cadmium in Plankton: Elevated Concentrations off Baja California: *J. H. Martin* and *W. W. Broenkow* 884

Wurtzite: Long-Period Polytypes in Disordered 2H Crystals: *M. E. Fleet* 885

Evolution of Type C Viral Genes: Origin of Feline Leukemia Virus: *R. E. Benveniste, C. J. Sherr, G. J. Todaro* 886

Substance P: Localization in the Central Nervous System and in Some Primary Sensory Neurons: *T. Hökfelt* et al. 889

Induction of F₁ Hybrid Antiparent Cytotoxic Effector Cells: An in vitro Model for Hemopoietic Histoincompatibility: *G. M. Shearer* and *G. Cudkowicz* 890

Differentiation of Erythroleukemic Cells in the Presence of Inhibitors of DNA Synthesis: *A. Leder, S. Orkin, P. Leder* 893

Prostaglandin F_{2α} Production by the Brain During Estrogen-Induced Secretion of Luteinizing Hormone: *J. S. Roberts* and *J. A. McCracken* 894

Cyclic AMP-Dependent Protein Kinase: Pivotal Role in Regulation of Enzyme Induction and Growth: *P. A. Insel* et al. 896

Collagen Biosynthesis in Blood Vessels of Brain and Other Tissues of the Hypertensive Rat: *A. Ooshima* et al. 898

Orientational Anisotropy in Infant Vision: *S. C. Leehey* et al. 900

Cortical Effect of Early Selective Exposure to Diagonal Lines: *A. G. Leventhal* and *H. V. B. Hirsch* 902

Modification of Cortical Orientation Selectivity in the Cat by Restricted Visual Experience: A Reexamination: *M. P. Stryker* and *H. Sherk* 904

Perceived Visual Motion as Effective Stimulus to Pursuit Eye Movement System: *S. Yasui* and *L. R. Young*. 906

Spout of the Gray Whale: Its Physical Characteristics: *G. L. Kooyman, K. S. Norris, R. L. Gentry* 908

Biogenesis of Erythropoietin: Evidence for Pro-Erythropoietin in a Subcellular Fraction of Kidney: *C. Peschle* and *M. Condorelli* 910

Stages in Adolescent Involvement in Drug Use: *D. Kandel* 912

Technical Comments: Pattern Discrimination After Lesions of the Visual Cortex: *M. E. Lewis* and *D. G. Stein*; *D. Dru*; ³¹P NMR in Cancer Amended: *K. S. Zaner* and *R. Damadian* 914

PRODUCTS AND MATERIALS	Electronic Balances; Chromatography Columns; Vacuum Pumps; Freeze Dryer; Disposable Micropipettes; pH Reference Electrodes; Alloy Sensor; Equilibrium Dialysis System; pH Measuring and Reference Electrode; Ultracentrifuge; Literature	916
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COVER

Scientists collecting plankton samples with special metal-free sampling gear from inflatable dinghy, several hundred meters from the R.V. *Cayuse* (Oregon State University). This procedure was necessary to obtain uncontaminated samples for determination of cadmium levels in plankton. See page 884 [Gregor M. Cailliet, Moss Landing Marine Laboratories, Moss Landing, California]

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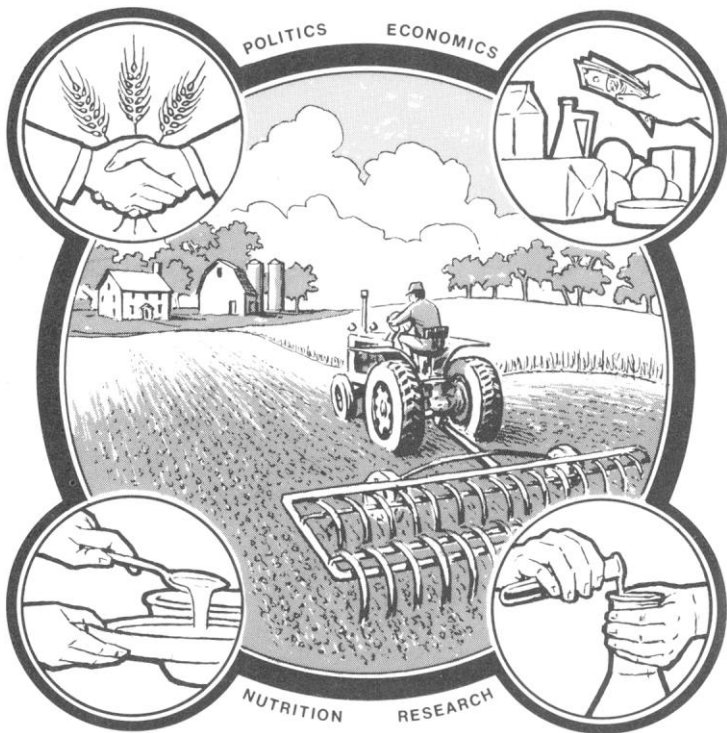
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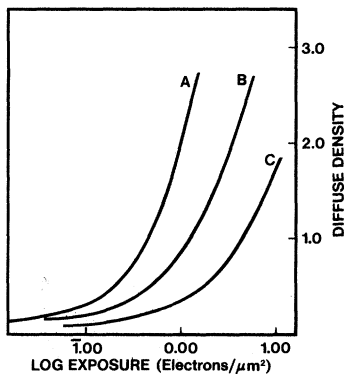
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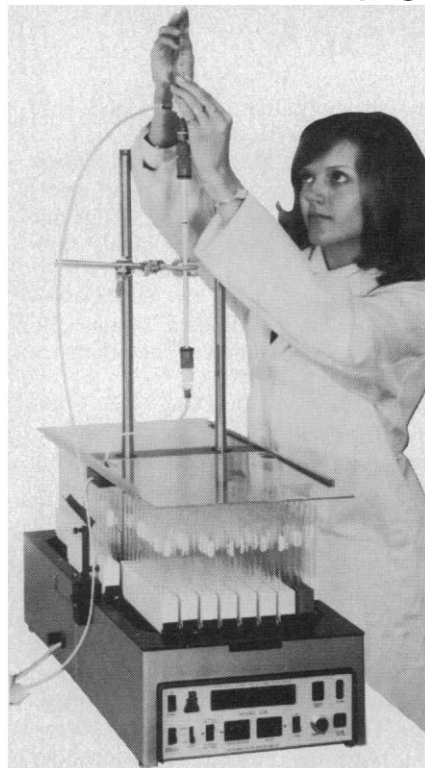
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LETTERS

Research and Public Funds

DeWitt Stetten's editorial (19 Sept., p. 953) and the several letters of comment (24 Oct., p. 324) have neglected a crucial point concerning "Freedom of inquiry." The real issue is not freedom to do research, since few areas of research are prohibited by law, but freedom to use taxpayer funds to conduct research that the taxpayer may not need or want, or may even oppose. Surely there is a major ethical issue here that supersedes any question of knowledge.

No one has seriously suggested that research on genetic contributions to intelligence be outlawed. However, many of us object vigorously to the use of our tax dollars for this purpose. In our view, satisfying the intellectual needs or desires of a few scientists is not an adequate reason for spending public funds.

The comparison between freedom of speech and freedom of research is misleading. I would not suggest that a law be passed prohibiting people from criticizing ethnic groups, but I would object vigorously to giving people federal grants to go around making such criticisms.

Stetten appears to object to political involvement in scientific decisions. I suggest that such political involvement is a necessary safeguard for all of us.

SOLOMON GARB
*American Medical Center at Denver,
Spivak, Colorado 80214*

Are the Data Worth Owning?

Three years ago, in an editorial in *Science* (30 June 1972, p. 1377), J. Ross MacDonald answered this question with an embarrassing and costly "No" for a major fraction of the published scientific and technical data. Since then, slow but steady progress has been made in increasing the reliability of data which is so essential for the orderly conduct of R & D programs. On a national level, the National Bureau of Standards' Office of Standard Reference Data, together with the American Chemical Society and the American Institute of Physics have launched the *Journal of Physical and Chemical Reference Data*. On an international level, CODATA, the Committee on Data for Science and Technology of the International Council of Scientific Unions, has stepped up its efforts to promote international cooperation in data evaluation and dissemination, with continued emphasis on high standards of data quality. CODATA also has broadened its scope to include the life sciences and ge-

sciences in addition to the physical sciences. In recognition of the growing role of CODATA, the National Academy of Sciences has invited CODATA to hold an open international scientific conference in the United States at Boulder, Colorado, in the summer of 1976. Persons working in the physical, life, and earth sciences as well as data handling specialists are urged to attend and discuss their approaches to problems of scientific data evaluation and dissemination. A successful conference of this kind will do much to raise an awareness of the need for greater support of high-quality data compilation, commensurate with the total R & D efforts.

W. DALE COMPTON
*Numerical Data Advisory Board,
National Academy of Sciences,
Washington, D.C. 20418*

Investment in Research

Arthur Kornberg, in his editorial of 22 August (p. 599), based on his 19 April address at the National Institutes of Health alumni reunion, states, "There is no industry based on technology today that spends less than 5 percent of its product [income] on research and development."

The petroleum refining industry, long considered to be a high-technology industry, spends considerably less than 5 percent. Its R & D costs have usually amounted to 1 percent or less of its product sales income.

WILLIAM T. KNOX
*3563 Hamlet Place,
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Black Ph.D.'s

The method employed by Joseph L. McCarthy and Dael Wolfe in their article "Doctorates granted to women and minority group members" (12 Sept., p. 856) does not give an accurate assessment of the number of doctorates awarded to Blacks for two main reasons: (i) a decreasing percentage of Blacks are obtaining doctorates from Association of American Universities (AAU) member institutions, and (ii) there is a distinct pattern of undergraduate origins of Black Ph.D.'s.

The percentage of science doctorates awarded to Blacks by AAU universities has steadily decreased since the 1930's. I maintain files on the number of science doctorates earned by American-born Blacks and, while my data do not include other degree fields, I am unaware of any significant differences between the institutions awarding science Ph.D.'s to Blacks

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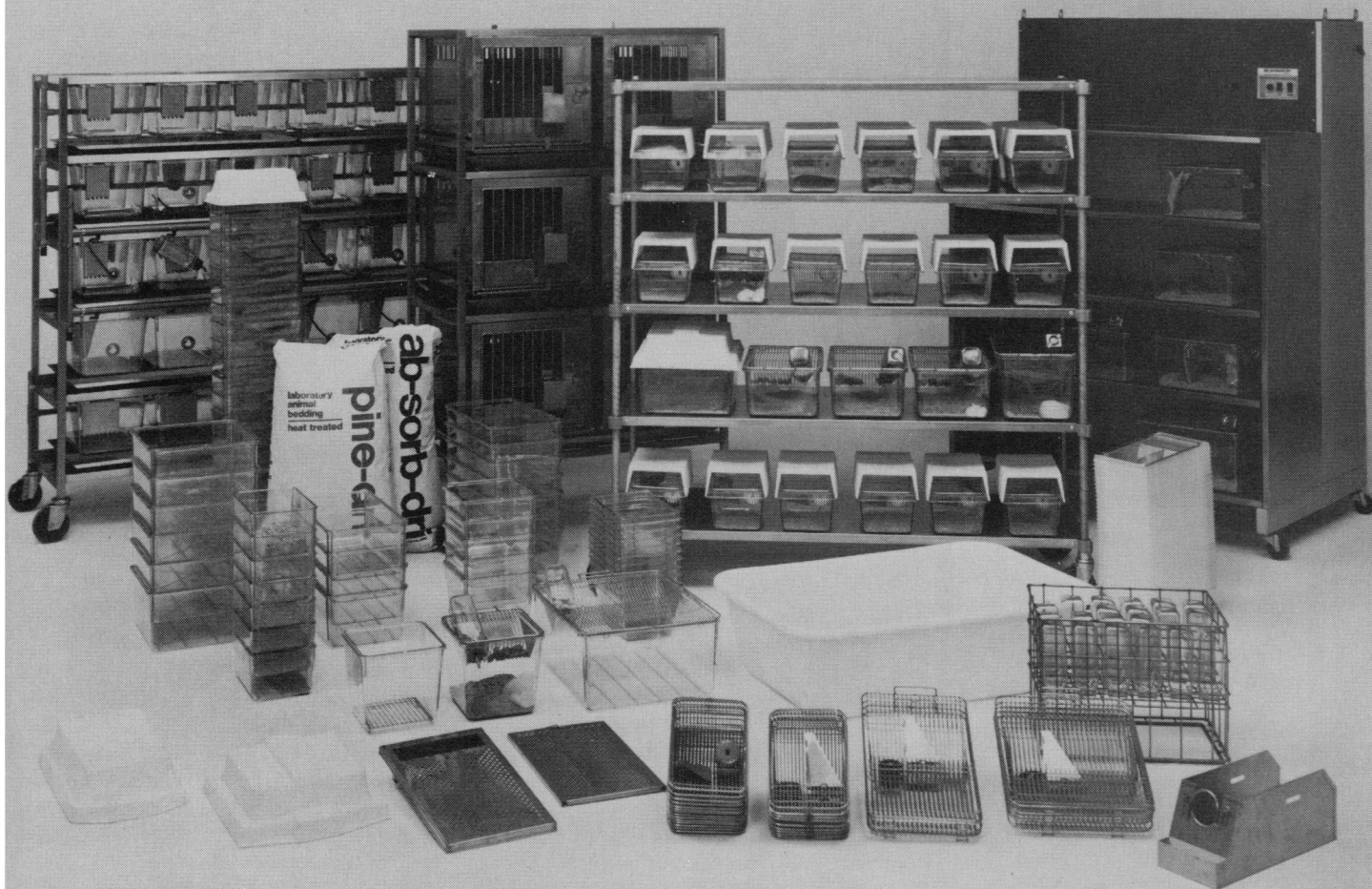
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Problem #1

How old is Jack?

If Jack were two years younger than Jill would be if Jill were two years older than half as old as Jack would be if Jack were two years younger than twice as old as Jill would be if Jill were twice as old as Jack is, he would be ten years older than he is now. (For answer, read on).

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and those that award nonsense Ph.D.'s (1). Between 1876 and 1930, only 13 science doctorates were awarded to American-born Blacks, and all but one of these was by an AAU university. Between 1876 and 1940, 91 Blacks received science doctorates, with 78, or about 86 percent, coming from AAU schools. For the calendar years 1969 to 1972, my files indicate 148 Black Ph.D. recipients, and only 70, or 47 percent, of these received their degrees from AAU universities. While I do not have data on all Black science doctorates for the past 5 years, my data are not biased in favor of either AAU or non-AAU schools, since I have not solicited names directly from any colleges or universities. I estimate that the AAU universities now account for no more than about 40 percent of Black doctorates in all fields. To apply the figures derived by McCarthy and Wolffe for minorities to Black doctorates is to underestimate the actual numbers being produced.

With respect to the reasons for the decline in Black doctorates awarded by AAU institutions, one need only consider that somewhere between 70 and 80 percent of Black Ph.D.'s receive their undergraduate degrees from the historically Black colleges and universities. Almost all of these institutions are located in the traditional South and are thus physically closer to a large number of non-AAU universities. Howard University is now a significant producer of Black doctorates, and it, along with Atlanta University, will become even more significant in the years to come.

The traditional undergraduate feeder source for a doctorate-granting institution is that same institution. This is true for the AAU universities as well as for others, with the number of institutions that are their "own sources" ranging from 12.7 to 57.4 percent for all doctorates awarded by the 34 leading AAU schools for the years 1920 to 1962 (2). Of 864 Black science Ph.D.'s listed in my files whose undergraduate institutions are known, only 113, or 13 percent, received their doctorates from AAU universities. Included in this number are some who received doctorates in 1975 (the total of American-born Black science Ph.D.'s does not exceed 1200). The 13 percent of Black science Ph.D.'s noted above is well below the "own source" average for AAU schools and is probably the same for all degree fields. Since the once racially segregated state universities are becoming more and more significant producers of Black Ph.D.'s (3), this may well reflect a shift to these institutions of Black undergraduates who seek doctorates.

It is difficult to deal with the number of doctorates and the patterns among such diverse groups as those considered by

McCarthy and Wolffe. Black students from other countries seeking doctorates in the United States should not be included with American-born Blacks. Likewise, the rationale for comparing the number of doctorates earned by Asian Americans to the number earned by Blacks and women at American universities escapes me, and I question the validity of this kind of study. The authors are to be thanked for calling attention to the errors in the 1973 figures on minority group doctorates compiled by the National Research Council.

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2. Office of Scientific Personnel, *Doctorate Production in United States Universities 1920-1962* (Publ. 1142, National Academy of Sciences-National Research Council, Washington, D.C., 1963).
3. Among the non-AAU universities with relatively recent histories of Black enrollment that are now, and will most likely continue to be, significant producers of Black Ph.D.'s are the universities of Alabama, Arkansas, Georgia, Miami, Mississippi, South Carolina, and Tennessee; Louisiana State University; and Texas A & M University.

Interdisciplinary Misunderstanding

The problems involved in putting together a wide-ranging interdisciplinary journal must be many. The goal of ensuring universal comprehension of even the titles must be beyond any editor's reach, I suppose. Yet I must share my disappointment (as a biopsychologist) on discovering that "Direct observation of domains in wet lipid bilayers" (24 October, p. 383) has nothing whatever to do with the ecology of waterfowl that lay high-cholesterol eggs in pairs.

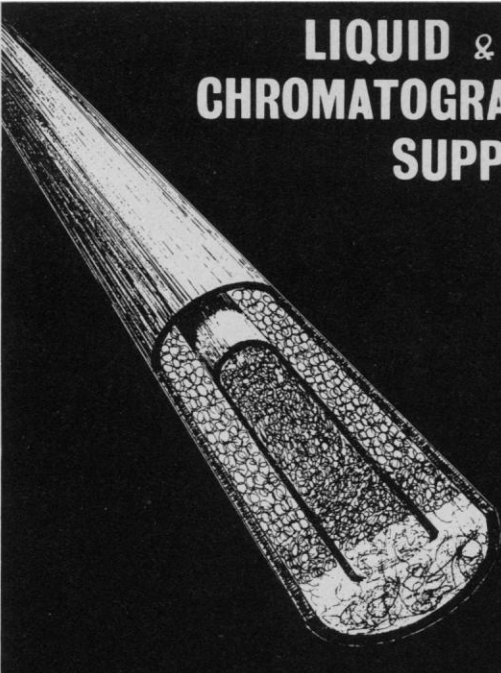
MERRILL E. SARTY

School of Medicine, University of Southern California, Los Angeles 90033

Erratum

In the issue of *Science* numbered 3995 of volume 173 [30 July 1971], the editors inadvertently published a copyrighted cartoon as a cover illustration and as a figure accompanying an article, without the permission of the artist, Mr. Charles A. Leap, of Fairbanks, Alaska. The cartoon was called "Solution Here in Time" and pictured a fanciful depiction of the Trans-Alaska Pipeline suspended from clouds to eliminate environmental concerns. The editors and the Association regret this mistake.—ED.

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Mutatis Mutandis: Congress, Science, and Law

The scientific community continues its seemingly endless debate about the roles of science and scientists in the body politic. Yet the content of the discourse reveals an uneasiness in coming to grips with the problems of relating science to the normative processes of representative government. Science is attempting to move from years of passiveness into the arena of public policy without having learned the finesse of politics.

Congress has been selected as the focal point for scientific input. Considering the limited role of the judiciary and the historical frustrations of dealing with the Executive Branch, choice of the Legislative Branch seems logical. But Congress is perhaps the branch of government least suited to receive, process, and use scientific information, not because of intellectual incapacity, but because of its organization and protocol and the nature of the legislative process.

Legislative policy is based more on form and procedure than on substance or scientific detail. There is a mismatch between what Congress needs and what science perceives that Congress needs—hence the plea for the "one-armed" scientist* and the rejoinder contrasting problem-solving in the scientific sense to legal and political procedures†.

The natural tendency in conflict is to accuse the other party of shortcomings while ignoring one's own deficiencies. Thus, scientists have attributed the problems of the political community to the domination of politics by lawyers, who are allegedly trained to win cases rather than to solve problems. But the failure of scientists to communicate effectively with legislators cannot be explained away on the basis of academic differences.

An attitudinal survey was conducted in 1972 among members of the American Bar Association's Natural Resources Law Section, a group of lawyers who are in close contact with scientists and engineers.‡ The results were startling. A significant number of the 575 respondents questioned the objectivity and veracity of scientists—qualities that are considered to be fundamental to science. Lawyers also perceived scientists to be narrow in their social outlook and provincial in their approach to problems.

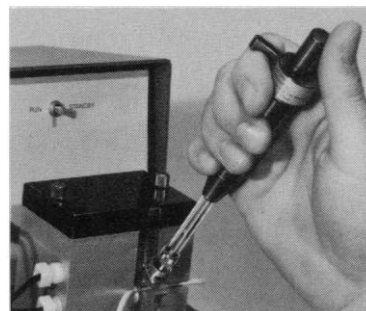
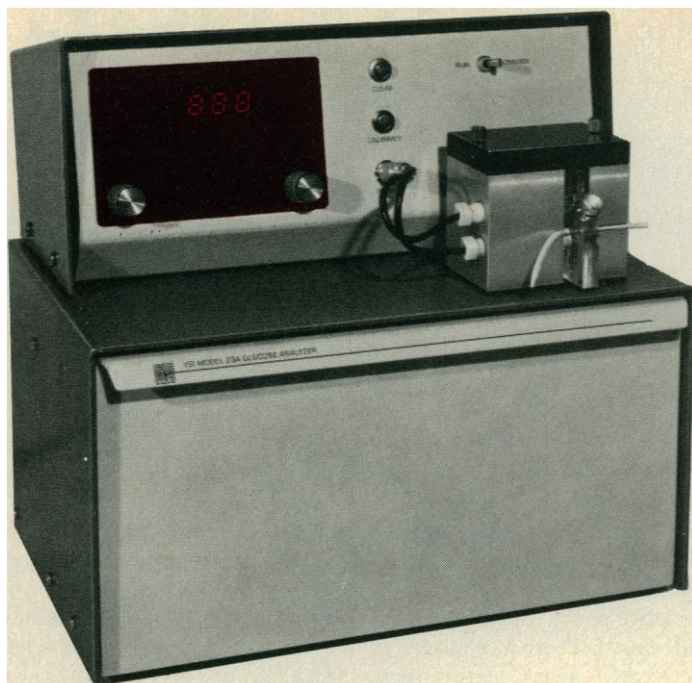
Given the opinions of lawyers as reflected by the survey, and considering the scientific community's attitude toward lawyers, it is not surprising that there is a communication gap with Congress. Whether the perceptions of the scientist or the lawyer are well founded is unimportant; that they exist at all is destructive of the communication process.

Steps have been taken to remedy this: (i) a joint committee of the American Association for the Advancement of Science and the American Bar Association has been established to improve interprofessional communication; (ii) the Office of Technology Assessment is now an institution of Congress; (iii) the AAAS and affiliated societies are sponsoring congressional science fellowships; and (iv) increasing numbers of scientists are attending law schools in recognition of the fact that law is at the interface of science and public policy.

If it is to be effective, the scientific community must learn to deal with Congress as it is, not as the scientist thinks it ought to be. We should, of course, continue to work for improvement of the legislative process; but we must recognize that representative government is, and should continue to be, predominantly an institution of laymen and generalists functioning as an alter ego of its constituents. Personal contact fosters understanding. This is demonstrated well by the experience of the congressional fellows. Having observed the first two groups of fellows function in the legislative milieu, I find it difficult to distinguish scientist from lawyer on Capitol Hill after a brief period of acclimatization. This suggests that it is perhaps the legislative process that molds the person, not the professional birthright. —JAMES W. CURLIN, *Senior Specialist in Ocean and Coastal Resources, Congressional Research Service, Library of Congress, Washington, D.C. 20540.*

*E. E. David, Jr., editorial, *Science* **189**, 679 (1975).
†J. W. Curlin, *ABA Journal* **59**, 157 (1973).

‡K. E. Boulding, editorial, *ibid.* **190**, 421 (1975).



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one-stage lesions and equivalent post-operative experience should be included for comparison. It might also be worth while to test intact rats given the same "interoperative" experiences as those animals with lesions, since restriction alone could produce temporary deficits in the performance of normal controls.

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4 April 1975

While the concern of Lewis and Stein is understandable, I wish to point out the following facts. Posterior extension of cortical lesions was limited by the vascularity of each particular animal. A little-reported but very consistent finding of surgery in this area is hemorrhage of up to 25 percent of total vascular volume secondary to disruption of meningeal vessels and major venous tributaries. Posterior extension of lesions therefore varied among animals,

and the variation extended across all groups. In the Lashley (1) article cited by Lewis and Stein, anterior lesion of the striate cortex resulted in the loss of all but 713 of the 34,000 neurons in the corresponding lateral geniculate nucleus. Comparable lesions in our animals resulted in elimination of all but 1200 to 2500 neurons. In our animals with more posterior lesions, as few as 250 neurons were spared. We thus remain content with our findings.

The conclusion of Lashley (1) as restated by Lewis and Stein, that rats with only 2 percent of the geniculo-striate system intact could solve visual problems similar to the one employed in our laboratory, was based on the results of one animal. More recent studies have demonstrated that pattern discrimination is dependent upon an intact visual cortex (2). Modern discrimination-testing equipment now controls for differences in luminance flux, and eliminates extraneous auditory and visual cues.

During initial design and fabrication of restraining devices, no type of restraining holder was ever found to affect later performance of normal animals on the aversive discrimination task.

DENISE DRU

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8 October 1975

³¹P NMR in Cancer Amended

In our recent report (1) we stated that, to the best of our knowledge, ³¹P NMR had not been applied before to organ tissues. Since then we have become aware of a prior publication by Hoult *et al.* (2) on ³¹P nuclear resonance in muscle. Priority for the first application of ³¹P NMR in tissue therefore rightly belongs to these workers, our work being the first introduction of ³¹P NMR into cancer research and cancer detection.

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New York, Brooklyn 11203

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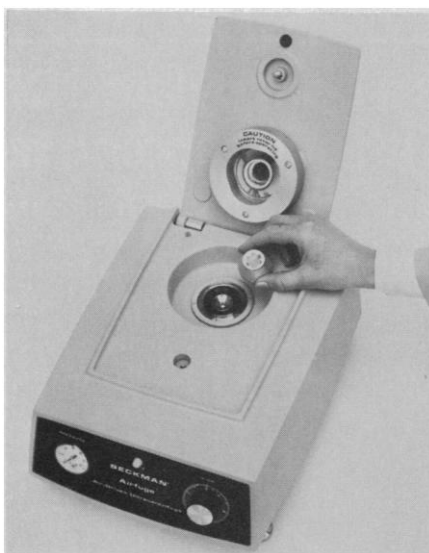


Fig. 1. An air-driven ultracentrifuge.

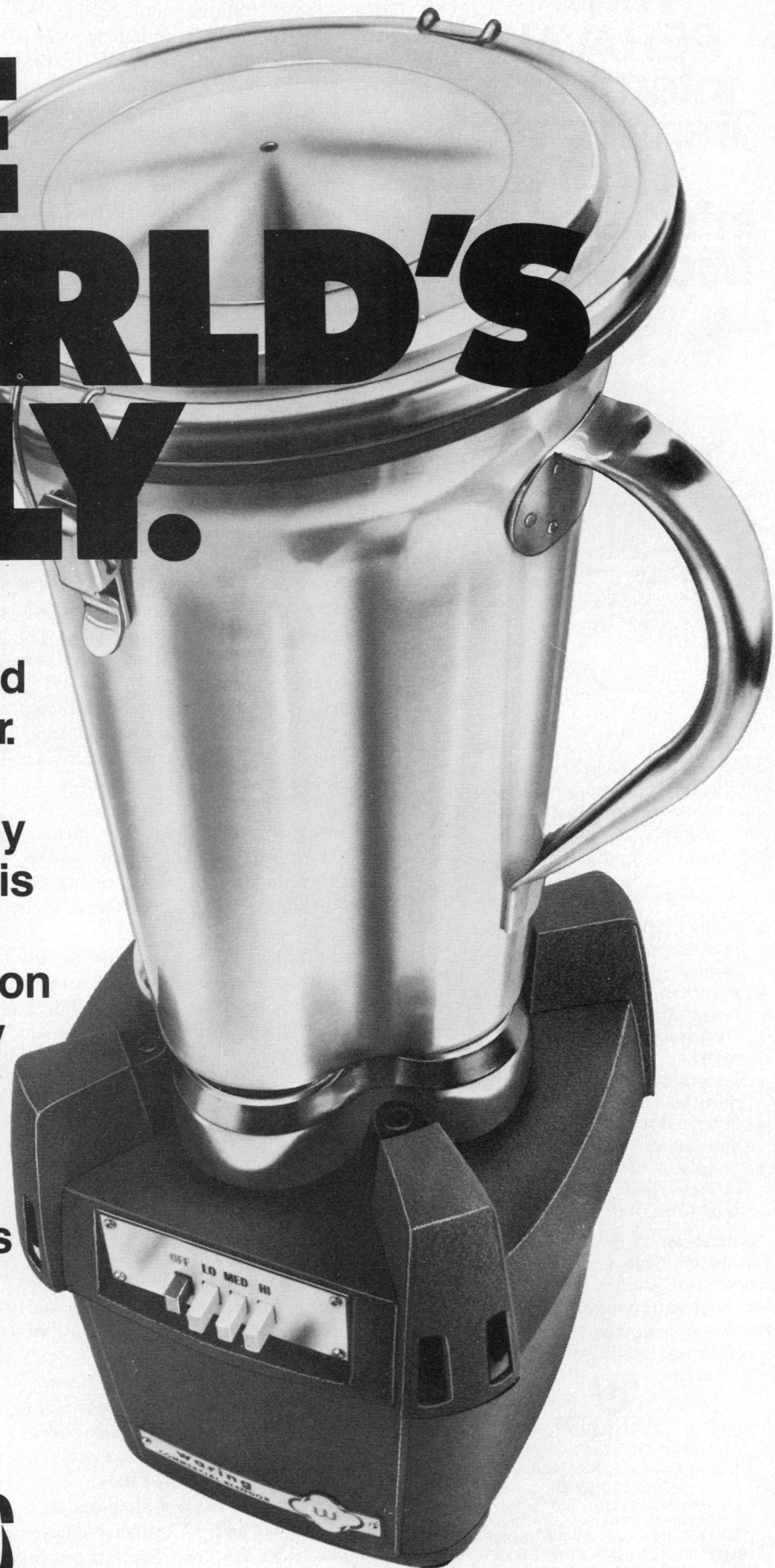
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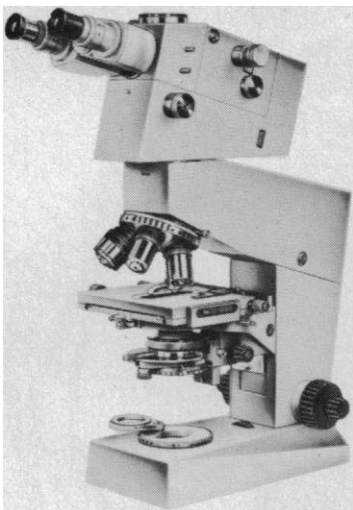
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HEALTH PROTECTION OF RADIATION WORKERS by W. Daggett Norwood, *Hanford Environmental Health Foundation, Richland, Washington.* Present knowledge regarding the hazards to the safety and well-being of persons working with radiation is summarized in this book. Discussed are established standards for health, safety and environmental protection along with their implementation, diagnosis and therapy for illness or injury. '75, 468 pp., 16 il., 16 tables, \$27.50

HEMISPHERIC DISCONNECTION AND CEREBRAL FUNCTION edited by Marcel Kinsbourne, *The Hospital For Sick Children, Toronto, Ontario, Canada,* and W. Lynn Smith, *Cortical Function Laboratories, Denver, Colorado.* (12 Contributors) This volume deals with perhaps the most rapidly growing, most discussed and most promising area in psychobiology — the functional relationships of the cerebral hemispheres. '75, 316 pp. (7 x 10), 89 il., 6 tables, \$21.50

ANAEROBIC BACTERIA: Role In Disease (2nd Ptg.) edited by Albert Balows, *U. S. Department of Health, Education, and Welfare, Atlanta, Georgia;* Raymond M. Dehaan, *Upjohn Company, Kalamazoo, Michigan;* V. R. Dowell, Jr., *Center for Disease Control, Atlanta, Georgia;* and Lucien B. Guze, *Department of Medicine, UCLA, Los Angeles, California.* (66 Contributors) This volume is an up-to-date information source on the bacteriology, clinical aspects, diagnosis and therapy of anaerobic bacterial infections. '75, 656 pp., 61 il., 121 tables, \$27.50

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RESEARCH NEWS

(Continued from page 870)

such aroma chemicals, however.

Test marketing of consumer products containing the counteractants—which Monsanto now calls amals—has already begun, although the company will not reveal the identities of manufacturers using them or of products incorporating them. They are not, however, present in certain highly advertised deodorizers that make rather extravagant claims. The products are being promoted cautiously because of the many previous times that manufacturers have made similar claims without being able to deliver. In the words of a Monsanto official, the industry "has cried 'Wolf!' once too often." The counteractants have been or will soon be used in home air fresheners and such products as depilatories, shampoos, and cosmetics, all of which often contain essential malodorous ingredients.

Other potential uses might be in deodorant soaps, home "permanents," underarm deodorants, douches, and pet litter boxes. Additionally, other work at Monsanto suggests that the counteractants could be incorporated into many industrial products in an encapsulated, slow-release form. Many kinds of box board, plastic tiles, paper, and other products, for example, produce odors that are not harmful, but that are offensive to potential purchasers of the products. Incorporation of the counteractants could overcome this problem.

Academic scientists have been reserved and skeptical about Schleppnik's claims, in large part because he has not been able to supply them with samples of the counteractants until Monsanto is protected by patents. But those who have smelled for themselves believe the phenomenon is real, regardless of whether Schleppnik's explanation of it is or is not correct. Some of the scientists, furthermore, suggest that the counteractants could be valuable for studying olfaction.

At present, the perception of odors can be blocked only with rather crude reagents that irreversibly alter receptors or the nerves connecting them to the brain. Because the effects of the counteractants are reversible, they should make it possible to conduct much more sophisticated experiments with the receptors. The counteractants might also be useful in the study of insect chemoreceptor systems and of proton transfer enzyme systems. But their value for such applications cannot be fully assessed until they are made available to more investigators.

—THOMAS H. MAUGH II

BOOKS RECEIVED

(Continued from page 878)

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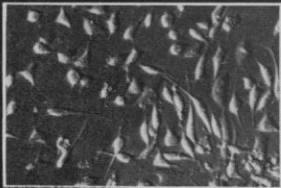
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Internment in Concentration Camps and Its Consequences. Paul Matussek with Rolf Grigat



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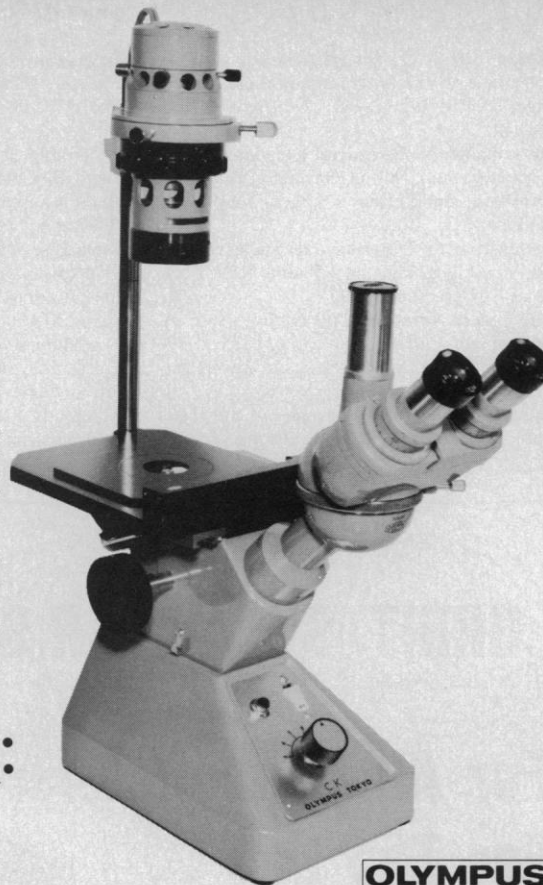
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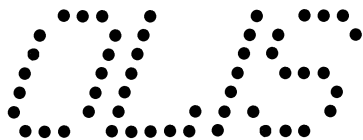
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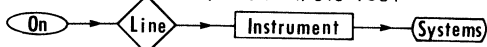
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Mouse IgG	Rabbit	61-204-1	\$40
Rat IgG	Goat	61-205-1	\$40
Rat IgG	Rabbit	61-206-1	\$40
Guinea Pig IgG	Goat	61-207-1	\$40
Guinea Pig IgG	Rabbit	61-208-1	\$40

Liquid FITC Conjugated IgG Fraction of Antiserum to:	Produced in	Code No.	Price (5 ml vial)
Bovine IgG	Rabbit	64-164-1	\$35
Dog IgG	Rabbit	64-165-1	\$35
Guinea Pig IgG	Rabbit	64-166-1	\$35
Hamster IgG	Rabbit	64-167-1	\$35
Horse IgG	Rabbit	64-168-1	\$35
Human IgG	Rabbit	64-169-1	\$38.15
Human IgG	Goat	64-170-1	\$38.15
Mouse IgG	Rabbit	64-171-1	\$38.15
Porcine IgG	Rabbit	64-172-1	\$35
Rabbit IgG	Goat	64-173-1	\$38.15
Rat IgG	Rabbit	64-174-1	\$38.15

Liquid FITC Conjugated Globulins Fraction of Antiserum to:	Produced in	Code No.	Price (5 ml vial)
Bovine Globulins	Rabbit	64-195-1	\$33
Chicken Globulins	Rabbit	64-196-1	\$33
Dog Globulins	Rabbit	64-197-1	\$33
Guinea Pig Globulins	Rabbit	64-198-1	\$33
Hamster Globulins	Rabbit	64-199-1	\$33
Horse Globulins	Rabbit	64-200-1	\$33
Human Globulins	Rabbit	64-201-1	\$36
Sheep Globulins	Rabbit	64-205-1	\$33

Liquid FITC Conjugated IgG Fraction of Antiserum to:	Produced in	Code No.	Price (2 ml)
Human Fibrinogen	Goat	61-042-1	\$30
Human IgA	Goat	61-043-1	\$30
Human IgE	Goat	61-082-1	\$80*
Human IgG	Goat	61-041-1	\$30
Human IgM	Goat	61-044-1	\$30

*(5 ml)



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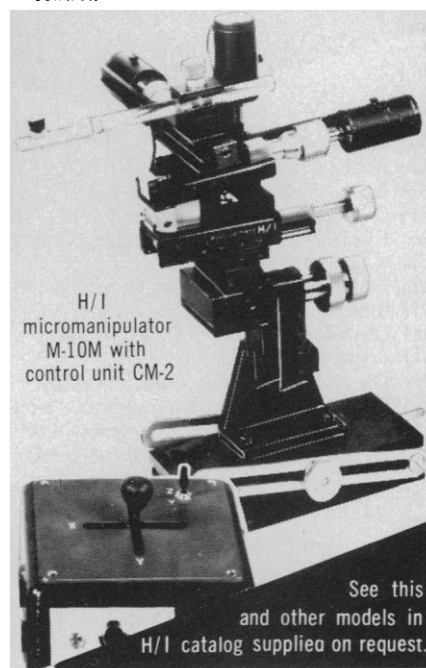
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