SCIENCE

28 November 1975

Volume 190, No. 4217

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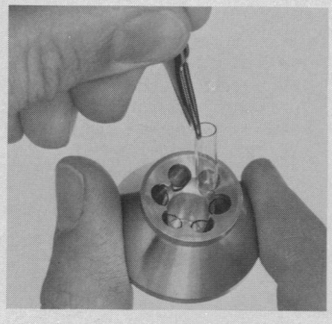

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COVER

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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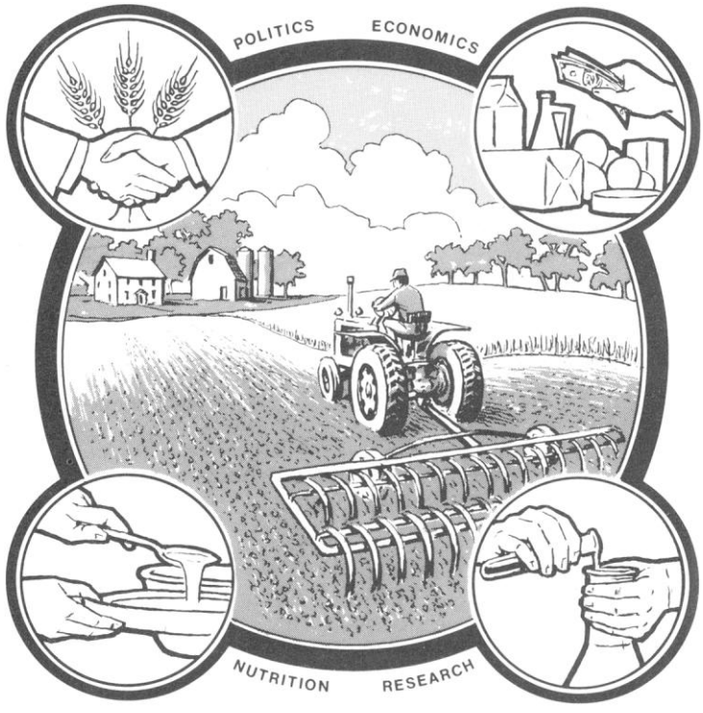

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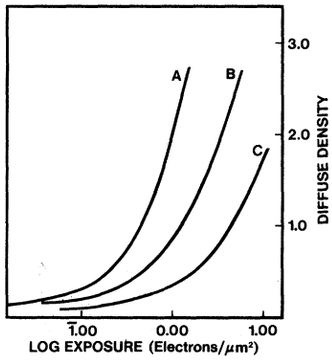

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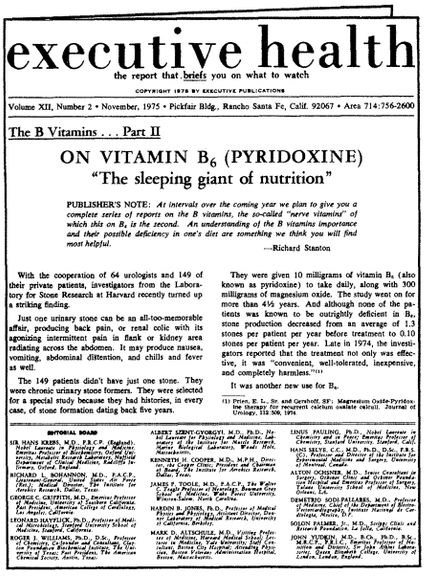

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ON VITAMIN B_6 (PYRIDOXINE)

"The sleeping giant of nutrition"

PUBLISHER'S NOTE: *At intervals over the coming year we plan to give you a complete series of reports on the B vitamins, the so-called "nerve vitamins" of which this on B_6 is the second. An understanding of the B vitamins importance and their possible deficiency in one's diet are something we think you will find most helpful.* —Richard Stanton

With the cooperation of 64 urologists and 149 of their private patients, investigators from the Laboratory for Stone Research at Harvard recently turned up a striking finding.

Just one urinary stone can be an all-too-memorable affair, producing back pain, or renal colic with its agonizing intermittent pain in flank or kidney area radiating across the abdomen. It may produce nausea, vomiting, abdominal distention, and chills and fever as well.

The 149 patients didn't have just one stone. They were chronic urinary stone formers. They were selected for a special study because they had histories, in every case, of stone formation dating back five years.

They were given 10 milligrams of vitamin B_6 (also known as pyridoxine) to take daily, along with 300 milligrams of magnesium oxide. The study went on for more than 4½ years. And although none of the patients was known to be outrightly deficient in B_6, stone production decreased from an average of 1.3 stones per patient per year before treatment to 0.10 stones per patient per year. Late in 1974, the investigators reported that the treatment not only was effective, it was "convenient, well-tolerated, inexpensive, and completely harmless."[1]

It was another new use for B_6.

(1) Prien, E. L., Sr. and Gershoff, SF.: Magnesium-Oxide-Pyridoxine Therapy for Recurrent Calcium Oxalate Calculi. Journal of Urology, 112:508, 1974.

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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 geosciences 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, Chevy Chase, Maryland 20015

Black Ph.D.'s

The method employed by Joseph L. McCarthy and Dael Wolfle 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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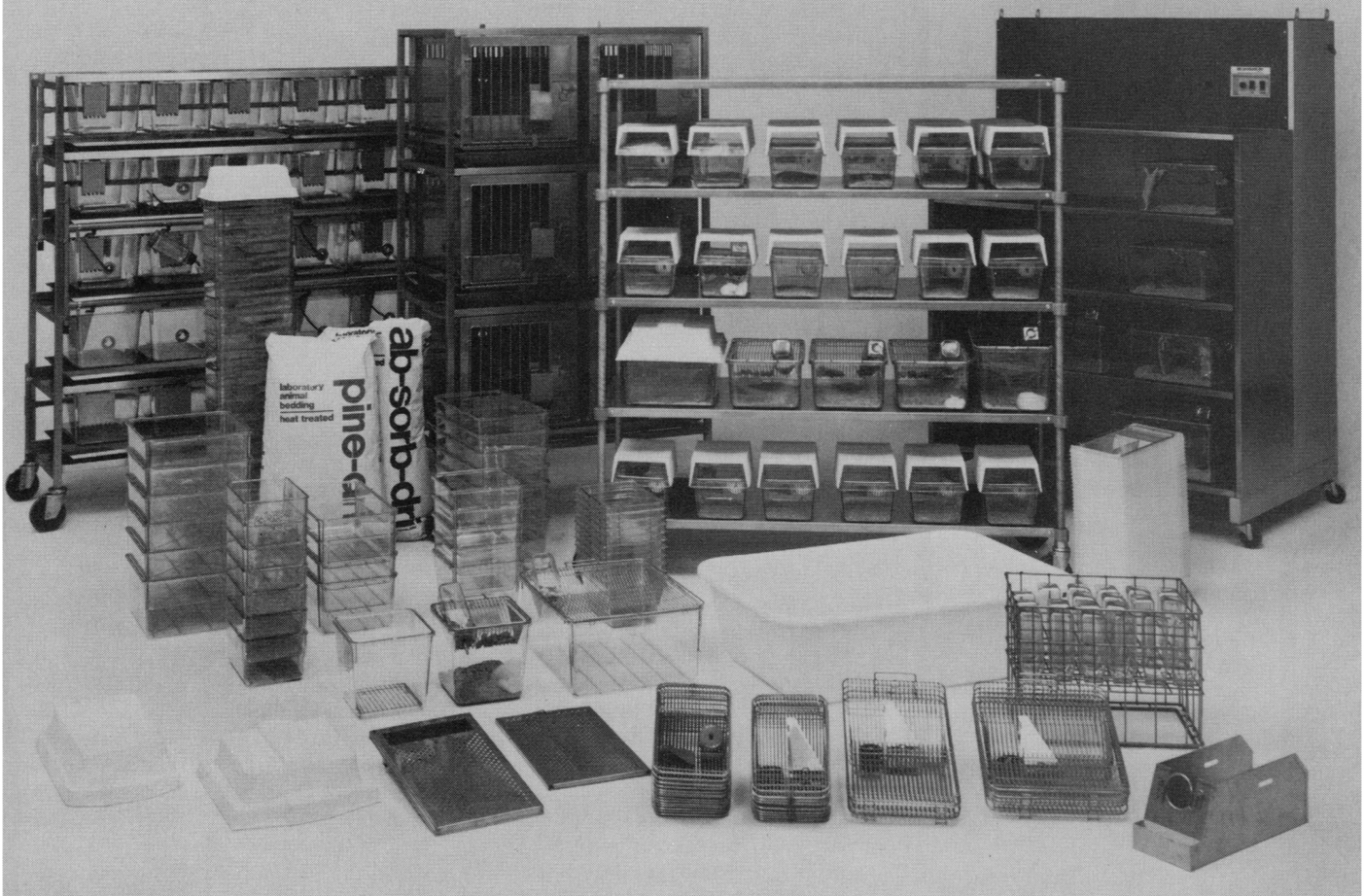

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and those that award nonscience Ph.D.'s (*1*). Between 1876 and 1930, only 13 science doctorates were awarded to American-born Blacks, and all but one of these was by an AAU university. Between 1876 and 1940, 91 Blacks received science doctorates, 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 Wolfle 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 Wolfle. 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.

JAMES M. JAY

Department of Biology, Wayne State University, Detroit, Michigan 48202

References

1. J. M. Jay, *Negroes in Science: Natural Science Doctorates, 1876–1969* (Balamp, Detroit, Mich., 1971).
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.

28 November 1975, Volume 190, Number 4217 **SCIENCE**

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.

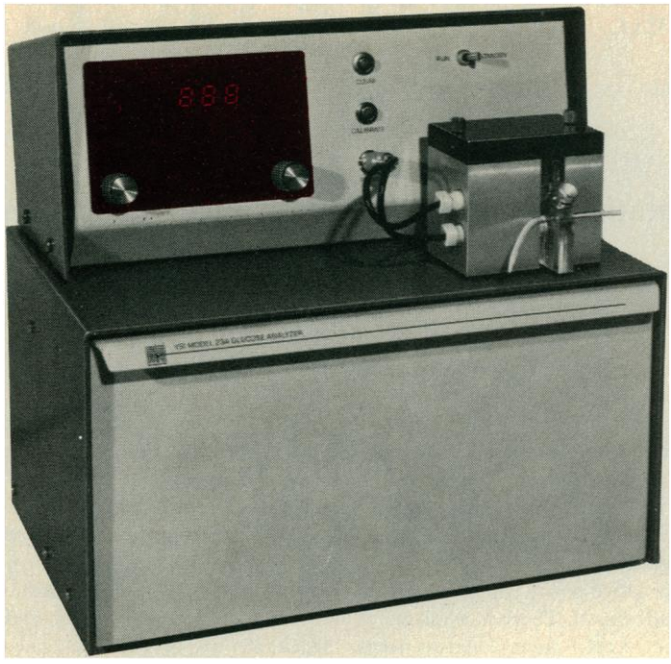
An attitudinal survey was conducted in 1972 among members of the American Bar Association's Natural Resources Law Section, a group of lawyers who are in close contact with scientists and engineers.‡ The results were startling. A significant number of the 575 respondents questioned the objectivity and 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.

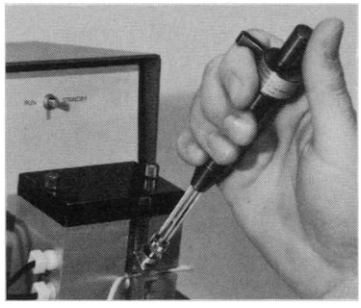
Given the opinions of lawyers as reflected by the survey, and considering the scientific community's attitude toward lawyers, it is not surprising that there is a communication gap with Congress. Whether the perceptions of the scientist or the lawyer are well founded is unimportant; that they exist at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

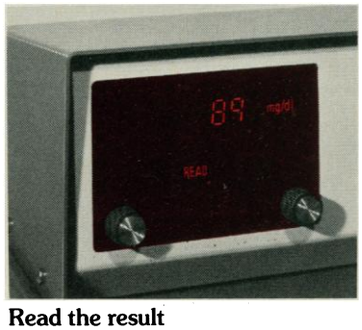
If it is to be effective, the scientific community must learn to deal with Congress as it is, not as the scientist thinks it ought to be. We should, of course, continue to work for improvement of the legislative process; but we must recognize that representative government is, and should continue to 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). †K. E. Boulding, editorial, *ibid.* **190**, 421 (1975). ‡J. W. Curlin, *ABA Journal* **59**, 157 (1973).





Inject the sample



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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.

MICHAEL E. LEWIS
DONALD G. STEIN
Department of Psychology, Clark University, Worcester, Massachusetts 01610

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4. S. Finger, B. Walbran, D. G. Stein, *Brain Res.* **63**, 1 (1973).

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
Huntington Institute of Applied Medical Research, Pasadena, California 91105

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8 October 1975

^{31}P NMR in Cancer Amended

In our recent report (*1*) we stated that, to the best of our knowledge, ^{31}P 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 ^{31}P nuclear resonance in muscle. Priority for the first application of ^{31}P NMR in tissue therefore rightly belongs to these workers, our work being the first introduction of ^{31}P NMR into cancer research and cancer detection.

KEN SCOTT ZANER
RAYMOND DAMADIAN
Department of Medicine and *Program in Biophysics, State University of New York, Brooklyn 11203*

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PRODUCTS and MATERIALS

Electronic Balances

Models 1604, 1605, and 1606 feature 4-, 5-, and 6-digit displays, respectively. All have a 1600-gram capacity. Sensitivity is 10 milligrams for the 1606, 100 milligrams for the 1605, and 1 gram for the 1604. A control bar turns the instrument on and tares it. Weight is displayed in 1.5 seconds. A time-averaging feature that will maintain stability in spite of vibration is available. These balances may be interfaced with data acquisition and analysis systems. Arbor Laboratories. Circle 794.

Chromatography Columns

Big Brother columns measure 1.0 by 120 centimeters. They are available in jacketed or unjacketed versions. They are also available with a 1.5-centimeter diameter. They offer borosilicate glass barrels, polypropylene end pieces with Luer fittings, and a column reservoir that is compatible with the optical polypropylene filling funnel. Luer stopcocks made from glass, nylon, or Teflon are also available. Bio-Rad Laboratories. Circle 795.

Vacuum Pumps

Model DD-50 delivers free air displacement of 50 liters per minute; model DD-100 delivers 100 liters per minute. Both of these VacTorr pumps feature direct drive with no external moving parts. They are readily portable and either will achieve a vacuum of 0.5 micrometer of mercury. Standard features include adjustable gas ballast, oil sight, oil drain and fill ports, thermal overload protector, line cord, and carrying handle. GCA/Precision Scientific. Circle 792.

Freeze Dryer

Drying time is reduced by flooding three hollow stainless steel shelves with rapidly flowing temperature transfer fluid. The fluid is refrigerated or heated as required. Specimen trays are held securely against the shelves to provide maximum transfer of heat of sublimation. A variety of trays and condensers is available for adaptation to specific research applications. FTS Systems. Circle 796.

Disposable Micropipettes

Full-Fill micropipettes are calibrated in microliter capacities with better than 1 percent accuracy. They are supplied in vials of 100. They are filled by capillary action or with a Spotting Bulb assembly supplied with each vial. They are particularly suited to sample application in thin layer chromatography and electrophoresis. Analtech. Circle 798.

*p*H Reference Electrodes

Long-life permanently sealed *p*H reference electrodes eliminate the need to add filling solutions at intervals and are suitable for use in pressurized process applications and in the research laboratory. They are supplied in virtually unbreakable polymer bodies or in glass bodies. Sensorex. Circle 801.

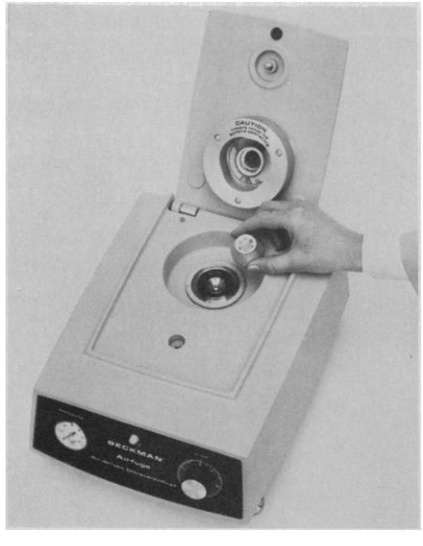

Fig. 1. An air-driven ultracentrifuge.

Alloy Sensor

This is a thermal voltage-sensing instrument. A cleaned sample of metal is placed between a clip lead and a hot post. The reading is compared to a chart to complete the test. Thermal voltage is developed when metals are electrically connected in a circuit with one hot and one cold junction. The resulting thermocouple, with joint temperatures held, produces a differential millivoltage based on the alloy tested and referenced to the hot post alloy. Howmar. Circle 799.

Equilibrium Dialysis System

This dialysis unit consists of Teflon cells made in halves. A Spectraphore membrane is positioned between halves and the unit is clamped shut. Samples are introduced through holes at the edge of the cell. Filling and emptying these cells eliminates problems caused by using dialysis bags. The system consists of 20 cells. Spectrum Medical Industries. Circle 793.

*p*H Measuring and Reference Electrode

The Meredian electrode consists of a Rytron body 5 inches long with a 12-millimeter outside diameter enclosing a gel-filled reference electrode and a conical *p*H-sensitive glass membrane. The range is from 0 to 14 *p*H units between 10° and 100°C. The geometry is such that reliable *p*H measurements can be made even in the presence of solution currents as high as 100,000 amperes. Leeds & Northrup. Circle 797.

Ultracentrifuge

Airfuge (Fig. 1) is a table-top device whose rotor is a miniature turbine powered by compressed air. It can spin 175-microliter samples at speeds up to 100,000 revolutions per minute and generate forces up to 160,000 times that of gravity. The device accelerates rapidly when compressed air is directed against fluted vanes in the rotor base. Speed is proportional to air pressure and is easily regulated. A timer permits setting for operation up to 5 hours and has a hold position to permit longer operation. An automatic valve system switches from

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drive to brake mode for a smooth 4-minute deceleration. Although a mechanical interlock prevents operation until the chamber cover is locked down, the spinning rotor is clearly visible through a heavy polycarbonate viewing port. After centrifugation, sample may be recovered by aspiration or by cutting the cellulose nitrate tubes. Sample fractions in the small-bore tubes are kept in place by surface tension. Beckman Instruments, Spinco Division. Circle 800.

Literature

Cellogel is devoted to a cellulose acetate gel medium for clinical and research electrophoresis. Kalex Scientific. Circle 789.

Automatic Peptide and Protein Sequencing Systems are described in a brochure. The operation, coupling methods and results possible are covered and a bibliography is included. Sequemat. Circle 802.

Tracer Sephadex is a guide to the use of microspheres for experimental research. Methods of labeling, advantages, and properties are discussed. Pharmacia Fine Chemicals. Circle 803.

Detectors for High Performance Liquid Chromatography is illustrated and application notes and design specifications are listed for each type of detector. DuPont Instruments. Circle 804.

Chromatography Accessories includes micro syringes, sample injectors, rotary valves, pneumatic actuators, tubing fittings, columns, and other items. Unimetrics. Circle 805.

Specialty Gases and Equipment are described in an 88-page illustrated catalog. Scientific Gas Products. Circle 806.

Nuclear Instrumentation Modules are suitable for scintillation, proportional and photon counting, and spectroscopic analyzers. Nuclear Data. Circle 807.

Medical Applications for the J16 Photometer discusses medical lighting as in phototherapy for hyperbilimbinemia in newborns, maintaining x-ray localizers, and measuring light in surgical and other settings. Tektronix. Circle 808.

Analog Recording Systems includes portable or rack-mounted devices for medical and scientific applications. Incor Instrumentation. Circle 809.

References for the Analytical Chemist describes publications in handbook form for spectroscopy, organic compound identification, chromatography, and many other fields. CRC Press. Circle 810.

Dilutors and Dispensers discusses operating principles and performance data as well as design features. Brinkmann Instruments. Circle 811.

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

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(Continued from page 878)

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