LETTERS

EDITORIAL
Science Advice for the Executive Branch ........................................ 119

ARTICLES
On the Specificity of Antibodies: F. F. Richards et al. .......................... 130
Prehistoric Agriculture in Tropical Highlands: O. F. Linares, P. D. Sheets, E. J. Rosenthal .......................... 137

NEWS AND COMMENT
National Institutes of Health: The Politics of Taste and Smell .......................... 145
Impact of Protocol Passage Diluted by Compromise .......................... 149
Robert W. Long: The Banker Who Heads Agricultural Research .......................... 150
Health Planning: New Program Gives Consumers, Uncle Sam a Voice .......................... 152

RESEARCH NEWS
Hemoglobin: Model Systems Shed Light on Oxygen Binding .......................... 154
Sociobiology (II): The Evolution of Social Systems .......................... 156

ANNUAL MEETING
The Quality of Science: A. Herschman; Programs of AAAS Sections .......................... 158
**BOOK REVIEWS**

Educability and Group Differences, reviewed by C. Denniston; The Social Behavior of the Bees, W. E. Kerr; Internal Rotation in Molecules, J. B. Lambert; Books Received .................................................. 161

**REPORTS**

Heat Flow and Convection Experiments aboard Apollo 17: P. G. Grodzka and T. C. Bannister .................................................. 165

Troponin and Parvalbumin Calcium Binding Regions Predicted in Myosin Light Chain and T4 Lysozyme: R. M. Tufty and R. H. Kretsinger .................................................. 167

Daily Rhythm in Human Urinary Melatonin: H. J. Lynch et al. .................... 169

5-Methyltetrahydrofolic Acid Is Not a Methyl Donor for Biogenic Amines: Enzymatic Formation of Formaldehyde: E. Meller et al. .................................................. 171

Chromatin Fragments Resembling v Bodies: M. B. Senior, A. I. Olins, D. E. Olins ........ 173

Coevolutionary Race Continues: Butterfly Larval Adaptation to Plant Trichomes: B. J. Rathcke and R. W. Poole ............................................. 175

Vesicular Binesis: Glucose Effect on Insulin Secretory Vesicles: K. H. Gabbay, J. Korf, E. E. Schneeberger .......................................................... 177

Adenosine 3',5'-Monophosphate Analogs Promote a Circular Morphology of Cultured Schwannoma Cells: J. R. Sheppard, T. H. Hudson, J. R. Larson .......................... 179

When Left-Handed Mice Live in Right-Handed Worlds: R. L. Collins ............... 181

**COVER**

Stone statues from Barriles, El Hato basin, Volcán Barú, Panama. Height is 2.80 meters. See page 137. [Museo Nacional de Panamá]
LETTERS  The Future of Fusion: V. L. Parsegian; C. Starr and W. Häfele; R. F. Post and F. L. Ribe; Thioctic Acid and Mushroom Poisoning: F. R. Alleva; F. C. Bartter  ....... 213

EDITORIAL  The World's Disparate Food Supplies  .......... 217

ARTICLES  Chan Chan: Andean Alternative of the Preindustrial City: M. E. Moseley  ....... 219
DNA Modification Mechanisms and Gene Activity during Development: R. Holliday and J. E. Pugh  ...... 226
AGRIS: J. F. Caponio and L. Moran  .......... 233

NEWS AND COMMENT  Fetal Research: The Case History of a Massachusetts Law  ............... 237
Robert A. Goldwin: Bridge Between Thinkers and Doers  ...... 239
Air Force R&D Policy: More for Basic Research, Universities  .......... 241
Congress Strengthens Freedom of Information Act  .......... 242
RESEARCH NEWS  Exploring the Solar System (V): Atmospheres and Climates  ............... 244
The Uniqueness of the Earth's Climate  .......... 245

BOOK REVIEWS  The Logic of Social Systems, reviewed by R. F. Salisbury; Zen and the Art of Motorcycle Maintenance, G. Basalla; Books Received  .......... 247
REPORTS

Fossils of Uncertain Affinity from the Upper Devonian of Iowa: R. A. Davis and H. A. Semken, Jr. ........................................ 251
Reduced Incidence of Spontaneous Mammary Tumors in C3H/He Mice after Treatment with Polyadenylate-Polyuridylate: F. Lacour, G. Delage, C. Chianale ........................................ 256
F Factor Promotes Turnover of Stable RNA in Escherichia coli: Y. Ohnishi ........................................ 257
2,3-Diphosphoglycerate: A Physiological Inhibitor of Platelet Aggregation: S. G. Iatridis et al. ........................................ 259
Collagenase Production by Lymphokine-Activated Macrophages: L. M. Wahl et al. ........................................ 261
Heavy Cosmic-Ray Exposure of Apollo Astronauts: E. V. Benton, R. P. Henke, J. V. Bailey ........................................ 263
Auditory Discrimination and Recall in Monkeys: J. H. Dawson, III, and A. C. Burlingame ........................................ 267
Dynamic Random-Dot Stereograms Reveal Up-Down Anisotropy and Left-Right Isotropy between Cortical Hemispheres: B. Breitmeyer, B. Julesz, W. Kropf ........................................ 269
Contradiction of Auditory and Visual Information by Brain Stimulation: D. Kleinnan and E. R. John ........................................ 271

PRODUCTS AND MATERIALS

Anion and Cation Exchanger Columns; Tritium Labeling Service; Background Correction System; Spectrophotometers; Clinical Enzymology Assay; Micro-Iontophoresis Programmer; Radiation Survey Meter; Electric Current Interrupt Alarm; Carbohydrate Standards; Chlorine Test Kit; Cardiac Evaluation System; Coulometer; Gel Filtration Medium; Literature ........................................ 280

COVER

Rats transported through a patterned environment do not recover pattern vision after serial visual cortex lesion. Rats allowed free movement in such environments do recover. See page 265. [Michael J. Danley, Huntington Institute of Applied Medical Research. Pasadena, California]
LETTERS
Harvard XYY Study: J. Beckwith et al.; W. H. Davis; M. Mage; Protein Production: H. Kehl; Computer-Assisted Education: T. W. Easton; Preclinical Medical Education: L. K. Steinrauf; J. C. Rose; Biochemistry Registry: L. Leive

EDITORIAL
Women, Men, and the Doctorate: B. M. Vetter

ARTICLES
Photochemical Reactions as a Tool in Organic Syntheses: N. J. Turro and G. Schuster
Functional Adaptation to High Altitude Hypoxia: A. R. Frisancho
Beginnings of Fruit Growing in the Old World: D. Zohary and P. Spiegel-Roy

NEWS AND COMMENT
Strategic Arms Limitation (1): The Decades of Frustration
Karl Hess: Technology with a Human Face
Abortion and Manslaughter: A Boston Doctor Goes on Trial

RESEARCH NEWS
Leukemia: A Second Human Tumor Virus
Multiple Minicomputers: Inexpensive and Reliable Computing

BOOK REVIEWS
Cold Spring Harbor Symposia on Quantitative Biology, reviewed by P. L. Webster: Biology of Fibroblast, L. Hayflick; Electrons in Fluids, W. L. Jolly; Chemical Applications of Molecular Beam Scattering, E. F. Greene; Aqueous Dielectrics, H. L. Friedman; Physics and Chemistry of Ice, F. H. Stillinger: Books Received

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly®. Second-class postage paid at Washington, D.C. Copyright © 1975 by the American Association for the Advancement of Science. Member rates on request. Annual subscription $40; foreign postage: Americas $5, overseas $8; air lift to Europe $20, single copies $1 (back issues $2) except Guide to Scientific Instruments which is $1. School year subscription: 9 months $30; 10 months $33.50. Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. Science is indexed in the Reader's Guide to Periodical Literature.
REPORTS

A Large-Scale Hole in the Ionosphere Caused by the Launch of Skylab:
M. Mendillo, G. S. Hawkins, J. A. Klobuchar ....................................... 343

Seasonal Change of Antarctic Sea Ice Cover: A. L. Gordon and H. W. Taylor ........ 346

Mercury Monitor for Ambient Air: T. Hadeishi et al. .................................... 348

Type C RNA Tumor Virus Isolated from Cultured Human Acute Myelogenous
Leukemia Cells: R. E. Gallagher and R. C. Gallo ........................................ 350

Polypeptide Composition of Fraction 1 Protein from Parasexual Hybrid
Plants in the Genus Nicotiana: S. D. Kung et al. ......................................... 353

Sex Pheromone of the Oak Leaf Roller: A Complex Chemical Messenger System
Identified by Mass Fragmentography: L. B. Hendry et al. ............................. 355

Low Frequency Electric Field Induced Changes in the Shape and Motility
of Amoebas: A. W. Friend, Jr., E. D. Finch, H. P. Schwan ............................ 357

Growth, Behavior, and Brain Catecholamines in Lead-Exposed Neonatal Rats:
A Reappraisal: M. Golter and I. A. Michaelson ........................................... 359

Secretion of a Nerve Growth Factor by Primary Chick Fibroblast Cultures:
M. Young et al. ...................................................................................................... 361

Synaptonemal Complex Complement of Man in Spreads of Spermatocytes, with
Details of the Sex Chromosome Pair: M. J. Moses, S. J. Counce, D. F. Paulson .... 363

Evaporative Water Loss in Box Turtles: Effects of Rostral Brainstem and
Other Temperatures: K. R. Morgareidge and H. T. Hammel ......................... 366

Dopamine β-Hydroxylase Activity in Brains of Chronic Schizophrenic Patients:
R. J. Wyatt et al.; C. D. Wise and L. Stein ...................................................... 368
LETTERS
A. Graen; Evolution and Education: G. G. Simpson; J. L. Fox; R. W. Lewis;
L. A. Muller; H. S. Tubish; J. V. Grabhiner and P. D. Miller ............. 388

EDITORIAL
President Ford's Energy Initiatives ........................................... 391

ARTICLES
Physics and Calculus of Countercity and Counterforce Nuclear Attacks: K. Tsipis ... 393
Sex Bias in Graduate Admissions: Data from Berkeley: P. J. Bickel,
E. A. Hammel, J. W. O'Connell ............................................. 398
Crisis Management: Some Opportunities: R. H. Kupperman, R. H. Wilcox,
H. A. Smith ............................................................................. 404

/5 AND COMMENT
Fetal Research (II): The Nature of a Massachusetts Law .................. 411
NIE: Beleaguered Institute Has a Stormy Past, a Cloudy Future ........ 413
Going Public with VX Formula—A Recipe for Trouble? .................. 414

RESEARCH NEWS
Earthquake Prediction: Progress in California, Hesitation in Washington .. 419
Nuclear Fusion: The Next Big Step Will Be a Tokomak .................. 421

AAAS NEWS
States' Role in Radioactive Material Management: W. A. Blanpied; A Request
to Readers: Notes from the Offices; NOVA Program Schedule ........... 424

BOOK REVIEWS
Problem, J. W. Hedgpeth; Feldspar Minerals, W. A. Deer .................. 428

REPORTS
Amorphous Solid Water: A Neutron Diffraction Study: J. Wenzel,
C. U. Linderström-Lang, S. A. Rice ........................................ 428
Continuous Random Network Model for Amorphous Solid Water: 
R. Alben and P. Boutron .................................................. 430
Enzymatic Characterization of Soluble Organic Phosphorus in Lake Water: 
S. E. Herbes, H. E. Allen, K. H. Manyc .................................. 432
Drought in the Sahara: A Biogeophysical Feedback Mechanism: 
J. Charney, P. H. Stone, W. J. Quirk ..................................... 434
Rubidium-87/Strontium-87 Age of Juvinas Basaltic Acheondrite and Early 
Mount St. Helens Volcano: Recent and Future Behavior: D. R. Crandell, 
D. R. Mullineaux, M. Rubin ............................................... 438
Callisto: Disk Temperature at 3.71-Centimeter Wavelength: G. L. Berge 
and D. O. Muhlenman ....................................................... 441
Morphine-Dependent Rats: Blockade of Precipitated Abstinence by 
Tetrahydropannabinol: B. Hine et al. ................................. 443
Primitively Columellaless Pollen: A New Concept in the Evolutionary 
Morphology of Angiosperms: J. W. Walker and J. J. Skvarla .... 445
Growth Hormone: Independent Release of Big and Small Forms from Rat 
Pituitary in vitro: M. E. Stachura and L. A. Frohman .............. 447
Endogenous Cyclic Adenosine Monophosphate in Tissues of Rabbits Fed an 
Atherogenic Diet: J. M. Augustyn and F. D. Ziegler ............... 449
Measles Virus: An Unwanted Variant Causing Hydrocephalus: 
M. V. Haspel and F. Rapp .................................................. 450
Aggressive Mimicry in Photuris Fireflies: Signal Repertoires by Femmes 
Fatales: J. E. Lloyd .......................................................... 452
Technical Comments: Erythrocytes in Human Muscular Dystrophy: T. D. Miale, 
J. L. Frias, D. L. Lawson; D. W. Matheson and J. Howland; Phosphorus 
Dynamics in Lake Water: Contribution by Death and Decay: R. A. Minear; 
D. R. S. Lean; Primate Evolution: Were Traits Selected for Arboreal 
Locomotion or Visually Directed Predation?: D. Raczkowski; M. Cartmill .... 453

Theoretical and Practical Uses of Plant Cell and Tissue Culture: L. G. Nickell; 
Isozymes: The Third International Conference: G. S. Whitt ........ 457

COVER
Fatal embrace. Photuris female (left) has seized a male of another species and is chewing on his thorax. When she is finished, little will remain except his eyes, feet, and wings. These females attract foreign males to them by mimicking the mating signals of their females. See page 432. [J. E. Lloyd, Department of Entomology, University of Florida, Gainesville]
LETTERS

EDITORIAL
Students. Careers, and the Recession: A. B. Grobman

ARTICLES
Global Increase in Quaternary Explosive Volcanism: J. P. Kennett and R. C. Thunell

NEWS AND COMMENT
Ford's First Budget: DOD, Energy R & D Up. Health Is Ailing
Phage in Live Virus Vaccines: Are They Harmful to People?
Quiet AAAS Meeting Dominated by Science Policy Talk
The CIA: Transportation Study Stirs New Charge of Impropriety

RESEARCH NEWS
Crystal-Growing in Space: Significance Still Up in the Air
Mass Spectroscopy: Adaptation for Nonvolatile Samples

BOOK REVIEWS
The Behaviour of Ungulates and Its Relation to Management, reviewed by E. O. Wilson; The Pituitary Gland, M. P. Schreiber; Free Radical Telomerization, E. S. Huys; The Biology of the Oceanic Pacific, G. T. Rowe; Science and Civilisation in China, C. S. Smith; Books Received
REPORTS

Freon Consumption: Implications for Atmospheric Ozone: S. C. Wofsy, M. B. McElroy, N. D. Sze .............................................................. 535

Earthquake Prediction: Modeling the Anomalous $V_p/V_s$ Source Region: D. T. Griggs et al. ................................................................. 537

Folate Transport by the Choroid Plexus in vitro: R. Spector and A. V. Lorenzo .... 540

Toxicology and Pharmacological Action of Anabaena flos-aquae Toxin: W. W. Carmichael, D. F. Biggs, P. R. Gorham ........................................ 542

Glucagon: Role in the Hyperglycemia of Diabetes Mellitus: R. Dobbs et al. .... 544

Increased Lever Pressing for Amphetamine after Pimozide in Rats: Implications for a Dopamine Theory of Reward: R. A. Yokel and R. A. Wise .... 547

Myogenic Defect in Acetylcholinesterase Regulation in Muscular Dystrophy of the Chicken: T. A. Linkhart, G. W. Yee, B. W. Wilson .................. 549

Nitrogen Fixation in Marine Shipworms: E. J. Carpenter and J. L. Culliney .... 551

Pregnancy in Cactus Mice: Effects of Prolonged Copulation: D. A. Dewsbury and D. Q. Estep ................................................................. 552

Sleep and Cardiac Rhythm in the Gray Seal: S. H. Ridgway, R. J. Harrison, P. L. Joyce ................................................................. 553

Technical Comments: Student Evaluation: M. Rodin; P. W. Frey; P. K. Gessner; Food Production and the Energy Crisis: A Comment: V. W. Ruttan; D. Pimentel ................................................................. 555

PRODUCTS AND MATERIALS

Liquid Dispensers; Incubator; Digital Timers; Photon Counter; Programmable Pocket Calculator; Magnetic Fluid Design Kit; Fluorescence Spectrophotometer; Inkless Chart Recorder; Video Disk Recording System; Cartridge Tape System; Scanning Polarograph; Holography System: Literature ................................................................. 562

COVER

Gray seal (Halichoerus grypus) spends most of its life in the sea and can sleep on the surface, underwater, and on land. The seal proceeds from active waking (upper left) to quiescent waking (upper center) to rapid eye movement sleep (upper right) to slow-wave sleep (lower six views). See page 553. [S. H. Ridgway and P. L. Romano, U.S. Navy, San Diego, California]
LETTERS

EDITORIAL
Delays in Tapping Energy Sources

ARTICLES
Reactions of Organic Crystals with Gases: I. C. Paul and D. Y. Curtin
Genetic Regulation: The Lac Control Region: R. C. Dickson et al.
Science Advice in the White House? Continuation of a Debate: E. B. Skolnikoff and H. Brooks

NEWS AND COMMENT
In Energy Impasse, Conservation Keeps Popping Up
The Environment, a “Mature” Cause in Need of a Lift
FAS Attacks Politicization of NIH
Congress Gets on with Reform, Seeks to Reassert Itself

RESEARCH NEWS
Sociobiology (I): Models of Social Behavior

AAAS NEWS
Office of Science and Society Programs; Office of Science Education; Notes from Other Offices; NOVA Program Schedule

BOOK REVIEWS
Frontiers in Catecholamine Research, reviewed by A. D. Smith; Genetics of Forest Ecosystems, J. L. Harper; The Physics of Phonons, A. A. Maradudin; Thomas Harriot, D. C. Lindberg
REPORTS

Soapstone Artifacts: Tracing Prehistoric Trade Patterns in Virginia:
A. H. Luckenbach, C. G. Holland, R. O. Allen ............................ 57

Atmospheric Trace Metals at Remote Northern and Southern Hemisphere
Sites: Pollution or Natural?: R. A. Duce, G. L. Hoffman, W. H. Zoller 59

Petroleum Pollutants in Surface and Groundwater as Indicated by the Carbon-14

Microwave Emission Spectrum of the Moon: Mean Global Heat Flow and
Average Depth of the Regolith: S. J. Keihm and M. G. Langseth 64

The Postspinel Phases in the Mg$_2$SiO$_4$-Fe$_2$SiO$_4$ System: L. Ming and W. A. Bassett 66

Deficient Ganglioside Biosynthesis: A Novel Human Sphingolipidosis:
P. H. Fishman et al. ............................ 68

Polarizing Fucoid Eggs Drive a Calcium Current through Themselves:
K. R. Robinson and L. F. Jafe 70

Spontaneous Regression of Friend Virus Induced Leukemia: Coinfection with
Regressing and Conventional Strains of Virus: P. Furmanski et al. 72

Specific Elicitors of Plant Phytoalexin Production: Determinants of Race
Specificity in Pathogens?: N. T. Keen ............................ 74

Halogenated Hydrocarbons in New Orleans Drinking Water and Blood Plasma:
B. Dowty et al. 75

Retrograde Amnesia: Temporal Gradient in Very Long Term Memory Following
Electroconvulsive Therapy: L. R. Squire, P. C. Slater, P. M. Chace 77

Technical Comments: Appraising Proposed Federal Standards for Water Resources
Investment: D. C. Major; C. Cicchetti et al.; Morpholine as Olfactory
Stimulus in Fish: T. J. Hara and S. Macdonald; J. C. Cooper and A. D. Hasler 79

PRODUCTS AND MATERIALS

Argon Ion Laser; Radiation Survey Meter; Spectrophotometer; Gaussmeter;
Constant Temperature Circulators; Gas Chromatograph; Metering Pump
for Liquid Chromatography; Seismic Profile Recorder; Pocket-Sized
Calculator; Literature ............................ 89

COVER

Nickel screen whose holes are filled with the eggs of the seaweed Pelvetia.
The eggs have a known orientation in the holes and such screens are used to
measure the ion fluxes into and out of the two poles of these eggs. Each hole
has a diameter of 75 micrometers. See page 70. [Kenneth R. Robinson,
Purdue University, Lafayette, Indiana]
Delays in Tapping Energy Sources

The public continues to enjoy adequate supplies of energy, but severe shortages lie ahead. Consumption of energy goes on unabated in spite of a recession, higher prices, and presidential appeals. But domestic reserves of hydrocarbons are being depleted rapidly and the stage is being set for empty gasoline pumps, cold homes, and large-scale unemployment unless there is a drastic change in attitudes soon. A major factor is the long time span involved in creating new sources of energy.

This country's experience with nuclear energy is an example of the time necessary to develop a major new source. The first reactor went critical in December 1942. In 1973, nuclear energy accounted for only 1 percent of the nation's energy consumption. Ten years from now, nuclear energy will meet at most 7 percent of the nation's needs. Moreover, the energy will be made available as electricity and not in forms that will be in short supply. Prospects for quick, large-scale utilization of geothermal energy, fusion, and solar energy are even dimmer than those for nuclear energy.

Thus, for at least the next decade, energy horizons will be limited by oil, natural gas, and coal. But available domestic supplies of oil and gas are diminishing, at the rate of 4 to 6 percent per year for oil and about 7 to 8 percent per year for natural gas,* and barriers have been erected to obtaining more oil or gas and to the use of coal.

Perhaps the most serious and certainly the least recognized problems lie in the supplies of natural gas. It heats 55 percent of the nation's homes, is widely used as a feedstock for petrochemicals, including fertilizer, and is by far the largest source of energy for industry. The energy content of the natural gas used daily by industry is equivalent to that of about 5 million barrels of oil. National policy accords priority to residential demand for natural gas, taking it away from industry. Already, shortages have caused layoffs. During the period August 1974 to August 1975, industry will use 400 million additional barrels of oil because of gas curtailments.† The rate of decay of supplies is such that by 1980, with a few exceptions, industry will be prevented from using natural gas. This would have enormous effects on the economy.

In large measure, although not entirely, future natural gas supplies will be tied to those of petroleum. There are good reasons to believe that onshore and undiscovered gas reserves of the 48 contiguous states are comparatively small.‡ New supplies could come from the outer continental shelves and from Alaska. At best, 4 to 6 years will elapse before these can be made available. However, at the present pace of resolving environmental disputes, supplies will be much longer in arriving.

An important aspect of the decaying position is that the kind of conservation that was achieved in 1973 and 1974 would make only a small dent in the problem. Then the public cut its use of natural gas by 6 to 8 percent, that is, 3 to 4 percent of total consumption. If the public spent many billions of dollars on storm windows and added insulation, 1 year's decay in the supplies of natural gas might be compensated for.

Conservation is not enough. To make good the energy deficit due to decay of natural gas alone, a doubling of coal production during the next 6 years would be required. But to open a new underground mine requires about 5 years. The quickest path toward relief is expansion of surface mining of low-sulfur coal in the Rocky Mountain States. But with various delays connected with eggshells from gas or oil to coal and with environmental controversies, heaven only knows when this country will emerge from the years of travail and discontent that it is now entering.—PHILIP H. ABELSON

* Oil and Gas Journal, 4 November 1974.
† Oil and Gas Journal, 25 November 1974.