

3 February 1984 • Vol. 223 • No. 4635

\$2.50

# SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





# BIOSYSTEMS UPDATE

## Gas-Phase Protein Sequencing

### A Progress Report

Less than two years ago, Applied Biosystems introduced new gas-phase protein sequencing technology which, though in its infancy, set new standards of analytical performance and sensitivity. We are now pleased to announce the first in a series of improvements in chemistry, programming and hardware which begin to further realize the still untapped potential of the Model 470A Gas-Phase Protein Sequencer.

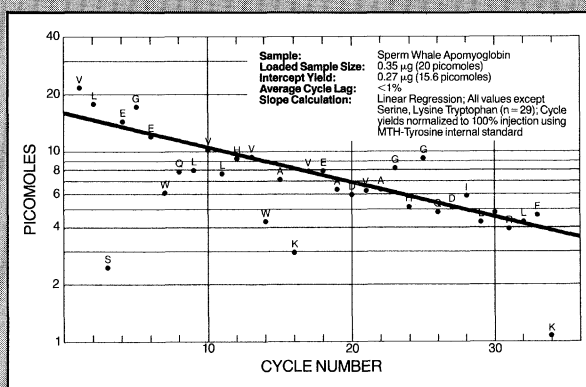
Changes in the coupling, cleavage and solvent extraction times, and use of an optional miniature sample cartridge, substantially in-

crease repetitive yields and decrease lag on picomole level samples. Sequencer artifacts which can interfere with high sensitivity PTH-AA chromatography are also reduced by a factor of three to five.

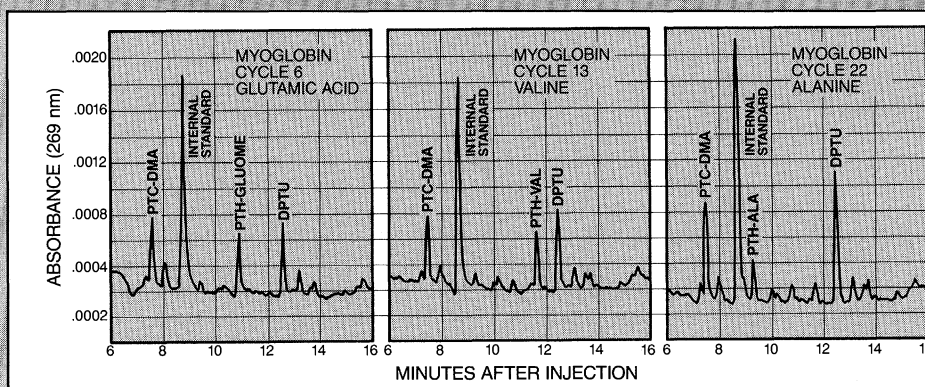
The improvements are particularly dramatic with peptides. A user evaluating our new chemistry has reported sequencing the octapeptide angiotensin II to completion with only 25 picomoles of sample.

A new miniature PTH conversion flask increases typical PTH-AA recovery to greater than 95%. The improvement is most significant on serine, threonine and tryptophan since drying times are reduced threefold.

Best of all, these improvements, and others still under development, are designed to be compatible with every instrument we've built so our current users will continue to be at the leading edge of protein sequencing technology. The 470A Gas-Phase Protein Sequencer is capable of setting even higher performance standards and Applied Biosystems, in collaboration with many of our users, is continuing to investigate further improvements to this remarkable instrument. Write or phone if you'd like more information.



34 residues of 20 picomoles of sperm whale apomyoglobin. Repetitive yield is 96% calculated from the least squares linear regression plot of individual amino acids quantitatively recovered at each sequenced cycle. Lag averages less than 1%/cycle.



Actual HPLC chromatograms, without background subtraction or data enhancement, of residues 6, 13 and 22 from sequencing analysis of 20 picomoles of sperm whale apomyoglobin. The data illustrate the low background and high sensitivity of the Model 470A Gas-Phase Protein Sequencer.\*

\*Chromatography: IBM Cyano Column. Internal Standard: MTH tyrosine. PTH yields normalized to 100% injection: Cycle 6 (glutamic acid)—11.7 pmol, cycle 13 (valine)—9.1 pmol, cycle 22 (alanine) 6.2 pmol. PTH-DMA, phenylthiocarbonyldimethylamine; DPTU, diphenylthiourea.



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## ANNOUNCING THE PROGRAM FOR FASEB SUMMER RESEARCH CONFERENCES FOR 1984

The Federation of American Societies for Experimental Biology will again present a series of Summer Research Conferences designed to meet the demand of experimental biologists for *intimate* and *detailed analysis* of current research in areas of intense scientific interest. The conferences, held weekly at the Vermont Academy in Saxtons River, Vermont, will be limited to an attendance of 150 persons and will be by invitation upon application. A conference fee of \$245 per person covers one week's room, board and registration. For additional information, a complete program and application form, see the February issue of *FEDERATION PROCEEDINGS*, Volume 43, Number 2, or contact Robert W. Krauss, 9650 Rockville Pike, Bethesda, MD 20814 (301) 530-7093.

### NEURAL MECHANISMS IN CARDIOVASCULAR REGULATION (June 10-15)

Chairman: Lawrence Schramm, Johns Hopkins University  
Vice-chairman: Franco Calaresu, University of Western Ontario

**Central Autonomic Neurotransmission.** L. Swanson, J. Unnerstall, S. Amara; **Peripheral Peptidergic Regulation of the Circulation.** J. Bevan, J. Lundberg, R. Bevan; **Autonomic Reflex Regulation of the Circulation During Exercise.** L. Stone, J. Mitchell, L. Rowell, J. Shepherd; **Central Peptidergic & Amino Acid Transmission.** I. Phillips, P. Sawchenko, W. Talman; **Ventral Medulla & Circulatory Regulation.** A. Loewy, C. Polosa, R. Dampney, C. Ross; **Low Pressure Baroreceptors.** D. Kostreva, K. Goetz, A. Nijima; **Ontogeny of Cardiovascular Regulation.** T. Slotkin, E. Mills, P. Gootman, M. Hofer; **Autonomic Ganglia & Cardiovascular Regulation.** D. Kreulen, W. Weems, A. Armour; **Nucleus Solitarius & Circulatory Regulation.** M. Nathan, R. Bucholz, P. Langhorst, P. Blessing.

### MICRONUTRIENTS: VITAMIN A AND RETINOIDS (June 17-22)

Chairman: Frank Chytil, Vanderbilt University  
Vice-chairman: James S. Olson, Iowa State University

**Absorption, Metabolism & Storage.** D. Goodman, A. McCormick, D. Ong, A. Ross; **Methods of Research.** J. Catignani, J. Olson, J. Smith; **Retinoids & the Skin.** P. Elias, E. Fuchs, H. Green, C. Orfanos; **Retinoids & Differentiation of Teratocarcinoma Cells.** W. Anderson, M. Sherman, S. Strickland; **Mechanisms of Action.** W. Cohn, M. Griswold, P. Peterson, S. Porter, F. Chytil; **Retinoids & Cancer.** L. DeLuca, R. Moon, Y. Muto, J. Wolf; **Clinical Applications.** P. Elias, F. Meyskens, L. Orfanos, G. Peck; **Mammary Carcinomas.** J. Rosen, A. Lacroix; **Retinoids & the Eye.** D. Bok, C. Bridges, G. Chader, J. Saari.

### DIAGNOSIS, TOXICITY & THERAPY OF TRICHOTHECENE MYCOTOXICOSIS (June 24-29)

Chairman: Robert Wannemacher, U.S. Army Medical Research Institute of Infectious Diseases  
Vice-chairman: Paul Newberne, Massachusetts Institute of Technology

**In Vivo Toxicity.** W. Buck, D. Bunner, H. Schiefer, N. Neufeld, A. Rogers, R. Lorenzana; **Mechanism of Action at the Cellular Level.** C. McLaughlin, J. O'Brien, C. Lafarge-Frayssen, J. Middlebrook, W. Thompson; **Metabolism.** C. Mirocha, J. Pace, M. Marletta, Y. Ueno, B. Wallner, S. Swanson, W. Busby; **Immuno Detection.** F. Chu, J. Hewitson, K. Hunter, L. Richer; **Organ Toxicity.** P. Newberne, G. Parker, V. Beasley, C. Hassler, W. Woods, B. Yagen, T. Cosgriff; **Chemistry & Detection by Physical Techniques.** J. Rosen, S. Missler, B. Jarvis, B. Heitke, R. Pawlosky, R. Black, W. Roush; **Therapy of Mycotoxicosis.** A. Meister, R. Fricke, M. Bayorh, G. Buchi, G. Lundren; **Human Effects Associated with Mycotoxicosis. Future Research Needs of the Health Service Community.** R. Wannemacher, S. Page, D. Bunner, D. Talmadge, USDA.

### IMMUNOPHARMACOLOGY (July 1-6)

Chairman: Lawrence Lichtenstein, Johns Hopkins University  
Vice-chairman: Anthony Allison, Syntex Research

**Phospholipid Turnover & Cell Activation.** R. Siraganian, M. Beaven, J. Mato; **Biological Origins of Arachidonic Acid.** T. Sullivan, P. Majerus, E. Lapetina, C. Parker, W. Scott; **Metabolism of Arachidonic Acid - Cyclo-oxygenase/Lipoxygenase Pathways.** R. Murphy, J. Oates, P. Needleman, R. Gorman, W. Lands; **Drugs Affecting Arachidonic Acid Release or Metabolism.** J. Rokach, W. Pickett; **Biological Effects of Lipoxygenase Products.** A. Ford-Hutchinson, R. Lewis, B. Whitman, H. Johnson; **Immunoregulation by Arachidonic Acid Metabolism.** E. Goetzl, M. Goodman, J. Goodwin, D. Payan, P. Sirois, V. Kelley; **Biological Effects of Non-arachidonic Acid-derived Lipids.** R. Pinckard, F. Snyder, F. Fitzpatrick, M. Halonen, P. Henson; **Oxidants in Relationship to Arachidonic Acid Metabolism.** J. Hoffeld, R. Mason, F. Kuehl, J. Humes, J. Hoffeld; **Lipoproteins as Immunoregulatory Molecules.** A. Allison, J. Harmony, C. Pierce, D. Webb, C. Pong.

### SOMATIC CELL GENETICS (July 8-13)

Chairman: Lawrence Chasin, Columbia University  
Vice-chairman: Thomas Caskey, Baylor College of Medicine

**Gene Transfer Systems.** M. Botchan, T. Grodzinger, R. Mulligan, B. Wakimoto; **Mutations & Recombination.** L. Chasin, M. Shure, A. Smith, G. Wahl; **Oncogenes.** M. Wigler, G. Cooper, H. Land, I. Verma; **Mammalian Cell Mutants.** L. Siminovitch, M. Gottesman, L. Herzenberg, L. Thompson; **Hormone Response.** P. Coffino, G. Firestone, H. Herschman, K. Paigen; **Genetics of Specialized Cells & Genes.** M. Pearson, C. Benayati, G. Martin, A. Skoultschi; **Expression of Transferred Genes.** W. Schaffner, M. Capecchi, T. Maniatis, U. Schibler; **Genes of the Immune System.** S. Weissman, M. Davis, S. Lewis, A. Ullrich; **Genes Related to Human Disease.** C. Caskey, A. Beaudet, J. Prockop, R. White.

### RECEPTORS (July 15-20)

Chairman: Robert Lefkowitz, Duke University Medical Center  
Vice-chairman: Henry Metzger, National Institutes of Health

**Biochemical Approaches to Studying Membrane Proteins in Integrated Systems.** H. Metzger, E. Racker, E. Elson, H. McConnell; **Receptors & Adenylate Cyclase System.** M. Caron, R. Lefkowitz, M. Smigel; **Receptors & Gene Expression.** B. O'Malley, G. Greene, C. Bardin; **Receptor Dynamics.** D. Lane, W. Schneider, W. Greene, R. Klausner; **Receptors & Ion Channels.** D. Triggler, R. Stroud, W. Catterall; **Growth Factor Receptors.** M. Czech, M. Billereal, M. Hayman; **Receptors of the Immune System.** R. Schwartz, M. Davis, E. Reinherz, W. Paul; **Insulin Receptors.** C. Kahn, S. Jacobs, M. Fehlmann, S. Taylor; **Overview Lecture.** I. Pastan.

### CALCIUM AND CELL FUNCTION (July 22-July 27)

Chairman: Claude Klee, National Institutes of Health  
Vice-chairman: Thomas Vanaman, University of Kentucky

**Structure/Function of Calcium Binding Proteins.** R. Williams, B. Levine; **Three Dimensional Structures of Calcium Receptor Proteins.** K. Moffat; **Calcium Sequestration & Extrusion Systems.** E. Carafoli, K. Philipson, D. McLennan; **Calcium Channels.** H. Reuter; **Calcium Dependent Regulation of Cytoskeleton & Cell Motility.** A. Means, S. Kakuchi; **Calcium Dependent Protein Kinases & Phosphatases.** P. Cohen; **Role of Calcium in Excitable Tissues.** P. Greengard, M. Nirenberg; **Summary Lectures.** C. Tanford.

### DEVELOPMENT AND SENESENCE OF THE IMMUNE SYSTEM (July 29-August 3)

Chairman: Marc Weksler, Cornell University Medical College  
Vice-chairman: Gregory Siskind, Cornell University Medical College

**Molecular Genetics of Lymphocyte Development.** M. Weigert, L. Hood; **Development of B Lymphocytes - In Vivo.** M. Cooper, N. LeDovarin, O. Witte, F. Ault; **- In Vitro.** W. Paul, R. Lynch, E. Vitetta; **Senescence of Humoral Immunity.** N. Klinman, E. Goidl, G. Doria; **Development of T Lymphocytes In Vivo.** O. Stutman, M. Bevan; **Development of T Lymphocyte Receptor.** H. Kunkel, S. Schlossman; **Senescence of Cellular Immunity.** R. Walford, R. Miller, W. Weigle; **Development of Macrophages.** E. Unanue, H. Grey, J. Chiller; **Impaired Development of the Immune System.** T. Waldmann, F. Rosen, R. Schwartz.

### LYMPHOCYTE AND ANTIBODY NETWORKS: IMPACT OF INFECTIOUS AGENTS (August 5-10)

Chairman: Charles Janeway, Yale University Medical School  
Vice-chairman: Leonard Chess, Columbia University

**Ia Antigens & Antigen Presentation.** D. Murphy, R. Schwartz; **Major Murine Models of Lymphocyte Abnormalities nu/nu, Xid, Anti-u, Germ Free, lpr/lpr & SCID.** H. Wortis, F. Steinberg; **Altered APC & Macrophage Function in Infection, Leprosy, Listeria, Pneumocystis, TB & Hodgkin's Disease.** E. Unanue, B. Bloom; **B Cells: Normal & Abnormal Activation, Growth, Antigen Presentation & Ig Genes.** F. Melchers; **Helper T Cells, Helper Cell Clones, T Cell Receptors, Ia & Ig Recognition.** C. Janeway, E. Reinherz; **Bacteria & the Immune Response.** D. Briles, R. Schwartz; **Regulatory T Cells, Suppressor T Cells, Contrasuppressor T Cells, Level II Suppression, Suppressor Factors, AMLR Induced Regulation & B Cell Paralysis.** L. Chess, M. Greene; **Viruses & the Immune Response; AIDS, HTLV, MVM, Activation of Autoantibody Production by Viruses & EBV.** R. Gallo, M. Oldstone; **Parasitic Infections & the Immune Response: Schistosomiasis, Leishmania, Malaria.** D. Sacks, D. Colley.

### NEURONAL CELL CULTURES (August 12-17)

Chairman: Phillip Nelson, National Institutes of Health  
Vice-chairman: Darwin Berg, University of California

**Growth Cones & Cell Interactions.** K. Pfenniger, G. Edelman; **Molecular Genetics.** W. Hahn, J. Sutcliffe, J. Merlie; **Factors-A.** H. Thoenen, P. Patterson, S. Varon; **Factors-B.** D. Brenneman, W. Matthews; **Synapse Formation - Receptors.** J. Sanes, J. McMahan; **Synapse Formation - Transmitters.** E. Furshpan, T. Jessel; **Ion Channels.** J. Talvenheimo, R. Aldrich; **Electrical Activity - Circuit Behavior.** L. Cohen, G. Gross, A. Grinvald; **Cell Separation - Cell Markers.** M. Raff, D. Trissler.

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## COVER

Neurons (A-type horizontal cells) in a cat retina showing morphological changes after treatment with the neurotoxin kainic acid. A toxin concentration gradient results in a sharp boundary separating a region of normal horizontal cell density from a region of total cell loss (top). The surviving cells, exposed to a sublethal kainic acid concentration, have contracted processes and therefore reduced overlap. In addition, they grow new processes into inadequate retinal layers. The field is 800 by 600 micrometers. See page 503. [Leo Peichl and Jürgen Bolz, Max-Planck-Institut für Hirnforschung, Frankfurt, West Germany]

# AAAS

## 1983 Annual Meeting Detroit Tapes

### Public Lectures

- AAAS Keynote Lecture: Science and the Urban University (David W. Adamany) #83AAAS/1 (1 tape, \$8.00)
- Adventure into Space (E. Margaret Burbidge) #83AAAS/6 (1 tape, \$8.00)
- Chemical Studies on the Origins of Life (Cyril Ponnamperna) #83AAAS/5 (1 tape, \$8.00)
- Prospects/Progress in High-Energy Physics (Leon M. Lederman) #83AAAS/7 (1 tape, \$8.00)
- Sealing Wax and String (Derek DeSolla Price) #83AAAS/3 (1 tape, \$8.00)
- Somatic Cell Genetics: Human Implications (Theodore T. Puck) #83AAAS/4 (1 tape, \$8.00)
- The People of Herculaneum of 79 A.D. (Sara C. Bisel) #83AAAS/8 (1 tape, \$8.00)

### Agriculture and Food

- Conservation of Animal Germ Plasm. #83AAAS/135-136 (2 tapes, \$16)
- New Frontiers in Agricultural Sciences and Their Societal Implications. #83AAAS/9-12 (4 tapes, \$32)
- Restructuring Policy for Agriculture: Some Alternatives. #83AAAS/93-94 (2 tapes, \$16)
- Rising Atmospheric Carbon Dioxide and Plant Productivity. #83AAAS/203-204 (2 tapes, \$16)
- Sources of Food From Rarely Used Plants. #83AAAS/147-148 (2 tapes, \$16)

### Arms Control and Security

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- The Technology of Peace Making. #83AAAS/39-40 (2 tapes, \$16.00)
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### Biological Sciences

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- Living Earth. #83AAAS/33-34 (2 tapes, \$16.00)
- Multidisciplinary Approaches to Plant Opal Phytolith Research. #83AAAS/193-196 (4 tapes, \$32.00)
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### Cell Biology and Genetics

- Dissecting the Interferon Boom: Lessons for Biomedical Research. #83AAAS/15-16 (2 tapes, \$16.00)
- Gene Regulation in Development. #83AAAS/97-98 (2 tapes, \$16.00)
- Low Molecular Weight Peptides and Control of Gene Expression in Normal and Cancer Cells. #83AAAS/71-72 (2 tapes, \$16.00)
- Monoclonal Antibodies: New Biological Probes. #83AAAS/229-230 (2 tapes, \$16.00)
- Polynucleotide Chemistry and the Regulation of Life. #83AAAS/213-214 (2 tapes, \$16.00)
- The Origins of Biological Information. #83AAAS/117-120 (4 tapes, \$32.00)

### Earth and Planetary Sciences

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### Economics and Industry

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- Normative Analysis. #83AAAS/61-64 (4 tapes, \$32.00)
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- Social, Political, and Economic Responses to Advances in Manufacturing Technology. #83AAAS/41-42 (2 tapes, \$16.00)

### Energy Alternatives

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- Energy: The Human Dimension. #83AAAS/95-96 (2 tapes, \$16.00)
- Limits to Solar and Biomass Energy Growth. #83AAAS/47-48 (2 tapes, \$16.00)
- The New Promise of Coal. #83AAAS/129-130 (2 tapes, \$16.00)
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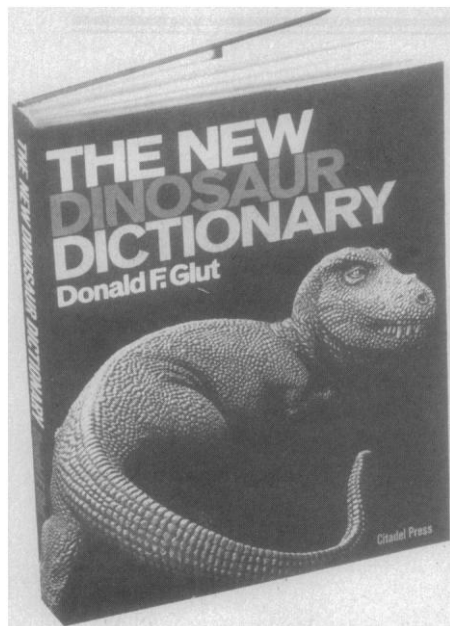
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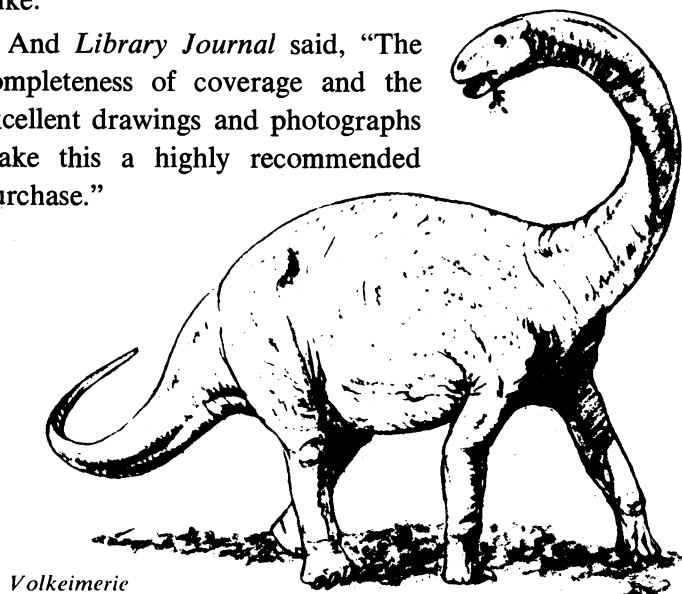


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# A Biological Survey of the United States

In this era of enhanced public awareness of the effects of acid rain, pesticides, industrial pollution, and other impacts of man on the environment, there is also a deficit of basic information on the composition of the biota of the United States. There has been considerable progress in the study of living organisms during the past two centuries, but no concerted effort has been undertaken to survey the entire U.S. fauna and flora. Less than one third of the organisms and their developmental stages that occur in this country have been described.

Most species surveys have been ad hoc and concerned with discrete groups of organisms in limited geographical areas. A few states (California, Florida, Illinois, New York, and Ohio among them) support biological surveys. The National Marine Fisheries Service publishes a series of identification manuals on the marine flora and fauna of the northeastern United States, and the U.S. Fish and Wildlife Service prints the *North American Fauna* on vertebrates. But most of the terrestrial flora and the terrestrial and freshwater invertebrates have not been described taxonomically, and identification manuals are rare or nonexistent even for many economically important groups.

Yet, without more extensive knowledge of the species components of the biota, it is virtually impossible to understand the effects of man's activities on natural habitats. Environmental impact statements are often superficial because many species encountered in a study area were previously unknown or recorded from only a few widely dispersed habitats; little or nothing is known about their true distribution and biology. Even information on the biota of our national, state, and local parks is limited principally to the conspicuous animals and plants; little or no data are available on the less visible but far larger portions of park wildlife. The 97th Congress was able to defeat all the proposed amendments to the Clean Air Act concerning acid rain because the legislators noted that more detailed information on the effect of this phenomenon was required. However, the basic taxonomic data needed to assess the effects are not available.

In 1977 the Canadian government initiated a biological survey in order to address such problems, and similar research has been done in other parts of the world. Countries where comprehensive surveys are conducted include Australia, Hungary, India, Israel, New Zealand, Saudi Arabia, South Korea, and the Soviet Union. Some of these surveys were begun more than 60 years ago.

The United States has yet to support a national survey, but a proposal for a Biological Survey of the United States (BISUS) has been presented to Congress. The program would (i) establish a survey to describe the plants and animals of the United States, (ii) fund basic taxonomic research on the biota, and (iii) produce identification manuals, species catalogs, atlases of biotic surveys, group classification systems, and other publications.

In 1982 and 1983, four national scientific organizations (including the AAAS) and two regional ones, altogether representing more than 150,000 members, passed or supported resolutions requesting that the federal government provide funds for a comprehensive biological survey. A proposal to initiate BISUS is now before the Senate Committee on Environment and Public Works. It is clear that agencies concerned with agriculture, forestry, fisheries, wildlife, and parks would benefit from BISUS. The public, science, and conservation programs would all be well served by such an important program.—MICHAEL KOSZTARAB, *Virginia Polytechnic Institute and State University, Blacksburg 24061*



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