

cal patterns of aquatic and terrestrial organisms, and, finally, ecological biogeography. There are, however, some inconsistencies within this outline. Quaternary phenomena are not discussed with other historical events but are included in the section on modern distributions. The unit on ecological biogeography, which contains some of the most interesting discussions, seems artificially separated from the unit on the ecological setting. The separation of the topics discussed in this last section (for example, island biogeography) undoubtedly reflects the influence of MacArthur on the authors. Obvious as well are Whittaker's ideas about plant community ecology. The notion of a climax community rates one line. The concept of plant formations, the basis of our biome and ecosystem nomenclature, is never clearly discussed even though formation names are used throughout.

In content the book is unquestionably unrivaled, although I think that many students will have difficulty in obtaining from it a feeling for how biogeographical studies are really done. The only detailed section that explains the processes involved in a historical biogeographical reconstruction is one dealing with phylogenetic systematics and vicariance biogeography. Within this short section, the authors do not make it clear that one can be a cladist and not a vicariance biogeographer or that, these days, one can be a cladist without an evolutionary premise. The authors also do not stress the importance of endemism in vicariance biogeography. After drawing a distinction between evolutionary and phylogenetic systematics, Brown and Gibson proceed to call many of the classical evolutionary studies they cite "phylogenetic treatments," which would certainly be interpreted by the naive reader to mean a cladistic treatment. More important perhaps, since this is supposed to be a textbook for undergraduates, is the absence of a feeling for the dynamism that makes biogeography appealing to many people. The abundance of works mentioned precludes detailed discussion of any of them. As a result, readers are left without a sense of the excitement of the original studies. Gone is the thrill of marching geofloras or the vivid imagery of organisms being swept up in the current of colonization from North to South America or being strained from the flow by a series of filters between the two continents. For advanced students and scientists familiar with the subject, this presents no problem because they will have read the original articles. For others, biogeography will probably appear

to be a rather flat discipline. Nevertheless, the wealth of information presented and its accumulation into a coherent framework clearly outweigh the book's shortcomings.

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Books Received

Animal and Vegetable Proteins in Lipid Metabolism and Atherosclerosis. Papers from a workshop, San Diego, 1981. Michael J. Gibney and David Kritchevsky, Eds. Liss, New York, 1983. x, 178 pp., illus. \$32. Current Topics in Nutrition and Disease, vol. 8.

Annual Review of Immunology. Vol. 1. William E. Paul, C. Garrison Fathman, and Henry Metzger, Eds. Annual Reviews, Palo Alto, Calif., 1983. xiv, 666 pp., illus. \$27.

Annual Review of Medicine. Selected Topics in the Clinical Sciences. Vol. 34. William P. Creger, Cecil H. Coggins, and E. William Hancock, Eds. Annual Reviews, Palo Alto, Calif., 1983. x, 578 pp. \$27.

Applied Optics and Optical Engineering. Vol. 9. Robert R. Shannon and James C. Wyant, Eds. Academic Press, New York, 1983. xx, 376 pp., illus., \$52.

Aquatic Resources Management of the Colorado River Ecosystems. Proceedings of a symposium, Las Vegas, Nov. 1981. V. Dean Adams and Vincent A. Lamarra, Eds. Ann Arbor Science (Butterworths), Woburn, Mass., 1983. xiv, 698 pp., illus. \$29.95.

The Archaeology of Monitor Valley. 1. Epistemology. David Hurst Thomas with contributions by Robert R. Kautz, Wilton N. Melhorn, Robert S. Thompson, and Dennis T. Trexler. American Museum of Natural History, New York, 1983. 194 pp., illus. Paper, \$17.50. Anthropological Papers of the American Museum of Natural History, vol. 58, part 1.

Assessment of Manganese Nodule Resources. The Data and the Methodologies. Published in cooperation with the United Nations by Graham and Trotman, London, 1982 (U.S. distributor, Crane, Russak, New York). x, 80 pp., illus. \$26. Seabed Minerals Series, vol. 1.

Child Health Policy in an Age of Fiscal Austerity. Critiques of the Select Panel Report. Papers from a colloquium, Chapel Hill, N.C., 1982. Ron Haskins, Ed. Ablex, Norwood, N.J., 1983. xxii, 232 pp., illus. \$27.50. Child and Family Policy, vol. 2.

Children's Early Thought. Developments in Classification. Susan Sugarman. Cambridge University Press, New York, 1983. xii, 234 pp. \$29.95.

Consciousness. Natural and Artificial. James T. Culbertson. Libra, Roslyn Heights, N.Y., 1983. xiv, 314 pp., illus. \$13.95.

Conserving Sea Turtles. Nicholas Mrosovsky. British Herpetological Society, c/o The Zoological Society of London, London, 1983. viii, 176 pp., illus. Paper, \$10.

The Coordination Chemistry of Metalloenzymes. The Role of Metals in Reactions Involving Water, Dioxygen, and Related Species. Proceedings of an institute, Pisa, May 1982. I. Bertini, R. S. Drago, and C. Luchinat, Eds. Reidel, Boston, 1983 (distributor, Kluwer Boston, Hingham, Mass.). xx, 392 pp., illus. \$56.50. NATO Advanced Study Institutes Series C, vol. 100.

Coronary Bypass Surgery. The Late Results. Karl E. Hammermeister, Ed. Praeger, New York, 1983. xii, 452 pp., illus. \$43.50.

Cosmochemistry and the Origin of Life. Proceedings of an institute, Maratea, Italy, June 1981. Cyril Ponnampuruma, Ed. Reidel, Boston, 1983 (distributor, Kluwer Boston, Hingham, Mass.). viii, 386 pp., illus. \$63. NATO Advanced Study Institutes Series C, vol. 101.

A Course in Linear Models. Anant M. Kshirsagar. Dekker, New York, 1983. xviii, 422 pp. \$32.75. Statistics, vol. 45.

Crystal Oscillator Circuits. Robert J. Matthys. Wiley-Interscience, New York, 1983. xiv, 234 pp., illus. \$30.

Current Topics in Microbiology and Immunology. 102. M. Cooper and seven others, Eds. Springer-Verlag, New York, 1983. iv, 152 pp., illus. \$36.

Deer Biology, Habitat Requirements, and Management in Western North America. Peter F. Ffolliot and Sonia Gallina, Eds. Instituto de Ecología, Mexico City, 1981. 240 pp., illus. \$30. Publication 9.

Defect Complexes in Semiconductor Structures. Proceedings of a school, Mátrafüred, Hungary,

Sept. 1982. J. Giber, F. Beleznyay, I. C. Szép, and J. László, Eds. Springer-Verlag, New York, 1983. vi, 308 pp., illus. Paper, \$18. Lecture Notes in Physics, vol. 175.

Defects, Fracture and Fatigue. Proceedings of a symposium, Mont Gabriel, Quebec, Canada, May 1982. G. C. Sih and J. W. Provan, Eds. Nijhoff, The Hague, 1983 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xx, 490 pp., illus. \$69.50.

Engineering Mechanics of Deformable Bodies. Edward F. Byars, Robert D. Snyder, and Helen L. Plants. Harper and Row, New York, ed. 4, 1983. xii, 548 pp., illus. \$32.50.

Environment, Drugs and Thermoregulation. Papers from a symposium, Saint-Paul-de-Vence, Nov. 1982. P. Lomax and E. Schönbaum, Eds. Karger, Basel, 1983. xvi, 222 pp., illus. \$47.50.

Environmental Chemical Analysis. Iain L. Marr and Malcolm S. Cresser. International Textbook Company, London, 1983 (U.S. distributor, Methuen, New York). xii, 258 pp., illus. \$39.95.

Environmental Law for Non-Lawyers. David B. Firestone and Frank C. Reed. Ann Arbor Science (Butterworths), Woburn, Mass., 1983. xiv, 282 pp., illus. \$27.50.

Environmental Pollution and Control. P. Aarne Vesilind and J. Jeffrey Peirce. Ann Arbor Science (Butterworths), Woburn, Mass., ed. 2, 1983. xiv, 398 pp., illus. Paper, \$14.95.

Environmental Science. The Study of Interrelationships. Eldon D. Enger, J. Richard Kormelink, Bradley F. Smith, and Rodney J. Smith. Brown, Dubuque, Iowa, 1983. xii, 530 pp., illus. Paper, \$20.95.

Estuaries and Enclosed Seas. Bostwick H. Ketchem, Ed. Elsevier, New York, 1983. xii, 500 pp., illus. \$170.25. Ecosystems of the World 26.

L'Evolution des Protéines. Papers from a meeting. Guy Hervé, Ed. Masson, Paris, 1983. viii, 172 pp., illus. Paper, 195 F. Collection de Biologie Evolutive, No. 8.

External Eye. Methods of Examination. Mogens S. Norn. Scriptor, Copenhagen, ed. 2, 1983. 212 pp., illus. \$36.

Extracellular Matrix. Proceedings of a symposium, Midland, Mich., June 1982. Susan Hawkes and John L. Wang, Eds. Academic Press, New York, 1982. xviii, 418 pp., illus. \$34.

Gemmological Instruments. Their Use and Principles of Operation. Peter G. Read. Butterworths, Boston, ed. 2, 1983. xii, 328 pp., illus. \$39.95.

Homotopy Methods and Global Convergence. Proceedings of an institute, Porto Cervo, Sardinia, June 1981. B. Curtis Eaves, Floyd J. Gould, Heinz-Otto Peitgen, and Michael J. Todd, Eds. Plenum, New York, 1983. viii, 318 pp., illus. \$45. NATO Conference Series II, vol. 13.

Hormonal Regulation of Mammary Tumors. Benjamin S. Leung, Ed. Eden Press, St. Albans, Vt., and MTP Press, Lancaster, England, 1982. Two volumes. Vol. 1, Steroid Hormones. xii, 308 pp., illus. \$35. Vol. 2, Peptide and Other Hormones. xvi, 284 pp., illus. \$35.

How Humans Adapt. A Biocultural Odyssey. Papers from a symposium, Washington, D.C., Nov. 1981. Donald J. Ortner, Ed. Smithsonian Institution Press, Washington, D.C., 1983. xxii, 560 pp. Cloth, \$19.95; paper \$9.95.

How to Attract the Wombat. Will Cuppy. Illustrated by Ed Nofziger. University of Chicago Press, Chicago, 1983. x, 160 pp. Paper, \$5.95. Reprint of the 1949 edition.

How to Become Extinct. Will Cuppy. Illustrated by William Steig. University of Chicago Press, Chicago, 1983. xii, 114 pp. Paper, \$4.95. Reprint of the 1941 edition.

How to Tell the Liars from the Statisticians. Robert Hooke. Illustrations by Joseph M. Liles. Dekker, New York, 1983. xvi, 174 pp. \$15.95.

How We Live. Victor R. Fuchs. Harvard University Press, Cambridge, Mass., 1983. xiv, 294 pp. \$17.50.

Human Anatomy. Doris Burda Wilson and Wilfred J. Wilson. Illustrations by Ruth Valleau. Oxford University Press, New York, ed. 2, 1983. x, 454 pp. \$26.95.

The Individual's Guide to Grants. Judith B. Margolin. Plenum, New York, 1983. xviii, 296 pp. \$15.95.

Industrial Respiratory Protection. Michael F. Teresinski and Paul N. Cheremisinoff. Ann Arbor Science (Butterworths), Boston, 1983. xiv, 350 pp., illus. \$27.50.

Information Sources in Architecture. Valerie J. Bradfield, Ed. Butterworths, Boston, 1983. xvi, 420 pp. \$69.96. Butterworths Guides to Information Sources.

Internal Kinematics and Dynamics of Galaxies. Papers from a symposium, Besançon, France, Aug. 1982. E. Athanassoula, Ed. Reidel, Boston, 1983 (distributor, Kluwer Boston, Hingham, Mass.). xvi,

(Continued on page 190)

Notice to Contributors

Efforts at *Science* to reduce a backlog of accepted reports in order to attain faster publication* have been successful. The acceptance rate for reports, which was reduced to about 10 percent over the summer, is now being increased. We are now able to publish reports within 2 months after acceptance on average.

*See notice in *Science*, 15 July, p. 259.

Reports

Rates of Evolution: Effects of Time and Temporal Scaling

Abstract. Rates of morphological evolution documented in laboratory selection experiments, historical colonization events, and the fossil record are inversely related to the interval of time over which they are measured. This inverse relationship is an artifact of comparing a narrow range of morphological variation over a wide range of time intervals, and it is also a product of time averaging. Rates measured over different intervals of time must be scaled against interval length before they can be compared.

Evolutionary change is often studied by calculation and comparison of rates. Rates measured over different intervals of geological time have been used to argue in various ways that vertebrates (principally mammals) evolved more rapidly than mollusks and other invertebrates (1-3). Rates derived from the fossil record have also been used to argue that mammals evolved more rapidly during the Pleistocene than during preceding epochs (4), and that phyletic evolution (microevolution) is too slow to explain diversification during episodes of adaptive radiation (macroevolution) (1, 5). As I shall show, perceived evolutionary

rates are a function of the time interval over which they are measured, and temporal scaling is required before rates measured over different intervals of geological time can be compared.

J. B. S. Haldane first proposed a standard unit, the darwin, widely used to measure rates of morphological evolution. A darwin (d) is defined as change by a factor of e per million years (my), where e is the base of natural logarithms (6). A logarithmic scale of measurement is appropriate because proportional rather than absolute change is of interest (3, 7). In an attempt to characterize distributions of empirically determined rates, I

compiled 521 rates of morphological evolution calibrated in darwins and measured over intervals of time ranging from 1.5 years to 350 million years (Table 1). These include I, very high rates (averaging about 60,000 d) measured in laboratory selection experiments; II, high rates (about 400 d) associated with historical colonization events; III, moderate rates (about 4 d) associated with faunal change following Pleistocene glaciation; and IV, low rates (about 0.1 d) typical of change documented on a longer time scale in the fossil record.

Evolutionary rates are routinely calculated and compared on the assumption that dividing observed change by elapsed time removes the effect of time on the result, that is, that rates are independent of measurement interval. This assumption is unjustified. Rates of morphological evolution compiled here are plotted against the interval of time over which each rate was measured (Fig. 1A). The observed distribution approximates an inverse power function, which can most easily be studied in logarithmic form (Fig. 1B). Evolutionary rates are negatively correlated with measurement interval and, in logarithmic form, this correlation has a coefficient of -0.94 .

The upper limit of \ln rates observed over all \ln time intervals (rates measured in darwins, time in million years) has a slope approximating -1.0 and an intercept of about 2.0 (dashed line in Fig. 1B).

Table 1. Relation of rates of morphological evolution (in darwins, d) to time intervals over which rates were calculated (in years, y, or million years, my) for each domain (Roman numerals) shown in Fig. 1. Rates are based on comparisons of linear measurements or counts (11). Average intervals and rates are calculated as geometric means (exponentiated means of \ln values). Asterisks indicate correlations significant at $P < 0.001$ ($P \sim 0.10$ for others).

Domain	Sample size	Time interval		Evolutionary rate (d)		Regression of \ln rate (d)/ \ln interval (my)	
		Range	Geometric mean	Range	Geometric mean	Slope	Correlation
I Selection experiments (9)	8	1.5-10 y	3.7 y	12,000-200,000	58,700	-0.90	0.60
II Colonization (12)	104	70-300 y	170 y	0-79,700	370	-2.08	-0.78*
III Post-Pleistocene Mammalia (4, 13)	46	1,000-10,000 y	8,200 y	0.11-32.0	3.7	-0.68	-0.22
IV Fossil Invertebrata and Vertebrata	363	8,000 y-350 my	2.8 my	0-26.2	0.08	-0.64	-0.70*
Fossil Invertebrata alone (3, 14)	135	0.3-350 my	7.9 my	0-3.7	0.07	-0.59	-0.52*
Fossil Vertebrata alone (1, 4, 15)	228	8,000 y-98 my	1.6 my	0-26.2	0.08	-0.82	-0.83*
I to IV combined	521	1.5 y-350 my	0.2 my	0-200,000	0.73	-0.85	-0.94*

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There is a \$5 entry fee (one fee per contestant; make check payable to AAAS Science Photography Contest). Please enclose the official entry form or a photocopy. **Rights and responsibilities.** The AAAS has the right to publish, exhibit, and use for promotional purposes any winning photograph. The AAAS assumes no responsibility for photographs entered. A stamped, self-addressed envelope must accompany all entries if you wish them returned. Submission of an entry constitutes acceptance of all rules and conditions. **Deadline.** All entries must be postmarked no later than December 1, 1983.

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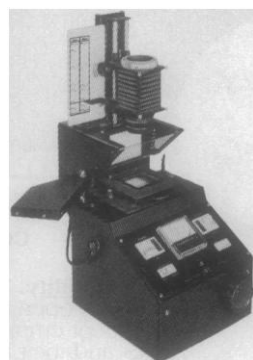
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BOOKS RECEIVED

(Continued from page 158)

432 pp., illus. Cloth, \$49.50; paper, \$26. International Astronomical Union Symposium No. 100.

In the Shadow of Man. Jane Goodall. Photographs by Hugo van Lawick. Houghton Mifflin, Boston, 1983. xxii, 298 pp. + plates. Paper, \$9.95. Reprint of the 1981 edition.

Molecular and Cellular Aspects of Shock and Trauma. Proceedings of a conference, Kona, Hawaii, June 1982. Allan M. Lefer and William Schurer, Eds. Liss, New York, 1983. xvi, 338 pp., illus. \$60. Progress in Clinical and Biological Research, vol. 111.

Molecular Pharmacology of Neurotransmitter Receptors. Tomio Segawa, Henry I. Yamamura, and Kinya Kuriyama, Eds. Raven, New York, 1983. xvi, 304 pp., illus. \$44. Advances in Biochemical Pharmacology, vol. 36.

Monitoring Solar Heating Systems. A Practical Handbook. R. Ferraro, R. Godoy, and D. Turrent, Eds. Published for the Commission of the European Communities by Pergamon, New York, 1983. xvi, 250 pp., illus. Paper, \$39.50.

More Science Braintwisters and Paradoxes. Christopher P. Jargocki. Van Nostrand Reinhold, New York, 1983. xii, 142 pp., illus. \$14.95.

The Motor Vehicle. K. Newton, W. Steeds, and T. K. Garrett. Butterworths, Boston, ed. 10, 1983. x, 742 pp., illus. \$59.95.

The Mouse in Biomedical Research. Vol. 4, Experimental Biology and Oncology. Henry L. Foster, J. David Small, and James G. Fox, Eds. Academic Press, New York, 1982. xiv, 562 pp., illus. \$85. American College of Laboratory Animal Medicine Series.

Multiple Cropping in the Humid Tropics of Asia. A. A. Gomez and K. A. Gomez. International Development Research Centre, Ottawa, Canada, 1983 (U.S. distributor, Unipub, New York). 248 pp. Paper, \$12. IDRC-176e.

Muscle Development. Molecular and Cellular Control. Papers from a meeting, Cold Spring Harbor, N.Y., Sept. 1981. Mark L. Pearson and Henry F. Epstein, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1982. xx, 582 pp., illus. \$57.

Muscles and Their Neural Control. Graham Hoyle. Wiley-Interscience, New York, 1983. xiv, 690 pp., illus. \$59.95.

Natural Product Chemistry. A Mechanistic and Biosynthetic Approach to Secondary Metabolism. Kurt B. G. Torrsell. Wiley, New York, 1983. xii, 402 pp., illus. \$54.95.

Neural Basis of Elementary Behavior in Stick Insects. Ulrich Bässler. Springer-Verlag, New York, 1983. xii, 170 pp., illus. \$32.60. Studies of Brain Function, vol. 10.

Neural Membranes. Papers from a symposium, Taipei, Taiwan, Aug. 1982. Grace Y. Sun, Nicolas Bazan, Jang-Yen Wu, Giuseppe Porcellati, and Albert Y. Sun, Eds. Humana, Clifton, N.J., 1983. xii, 584 pp., illus. \$49.50. Experimental and Clinical Neuroscience.

The Neurobiology of Opiate Reward Processes. James E. Smith and John D. Lane, Eds. Elsevier, New York, 1983. xx, 476 pp., illus. \$144.75.

Neurohemal Organs of Arthropods. Their Development, Evolution, Structures, and Functions. A. P. Gupta, Ed. Thomas, Springfield, Ill., 1983. xvi, 630 pp., illus. \$74.50.

N-Nitroso Compounds. Occurrence and Biological Effects. Proceedings of a symposium, Tokyo, Sept. 1981. H. Bartsch, I. K. O'Neill, M. Castegnaro, M. Okada, and W. Davis, Eds. International Agency for Research on Cancer, Lyon, 1983 (U.S. distributor, WHO Publications Centre USA, Albany, N.Y.). 1, 756 pp., illus. \$55. IARC Scientific Publication No. 41.

Perspectives on Genes and the Molecular Biology of Cancer. Papers from a symposium, Houston, Mar. 1982. Donald L. Robberson and Grady F. Saunders, Eds. Raven, New York, 1983. xviii, 330 pp., illus. \$49.50.

Pest Resistance to Pesticides. Papers from a seminar, Palm Springs, Calif., Dec. 1979. George P. Georgioui and Tetsuo Saito, Eds. Plenum, New York, 1983. xii, 810 pp., illus. \$89.50.

Petroanalysis '81. Advances in Analytical Chemistry in the Petroleum Industry, 1975-1982. Papers from a symposium, London, Oct. 1981. G. B. Crump, Ed. Published on behalf of the Institute of Petroleum, London, by Wiley Heyden, New York, 1983. xiv, 456 pp., illus. \$83.95.

Petroleum Exploration Strategies in Developing Countries. Proceedings of a meeting, The Hague, Mar. 1981. Published in cooperation with the United Nations by Graham and Trotman, London, 1982 (U.S. distributor, Crane, Russak, New York). xxviii, 272 pp., illus. \$33.

Photosynthetic Prokaryotes. Cell Differentiation



Ever-Expanding Horizons: The Dual Informational Sources of Human Evolution

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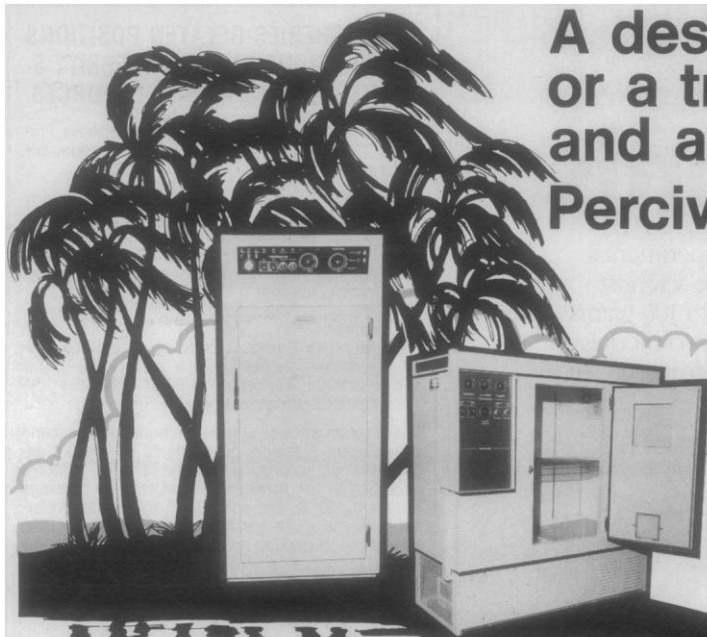
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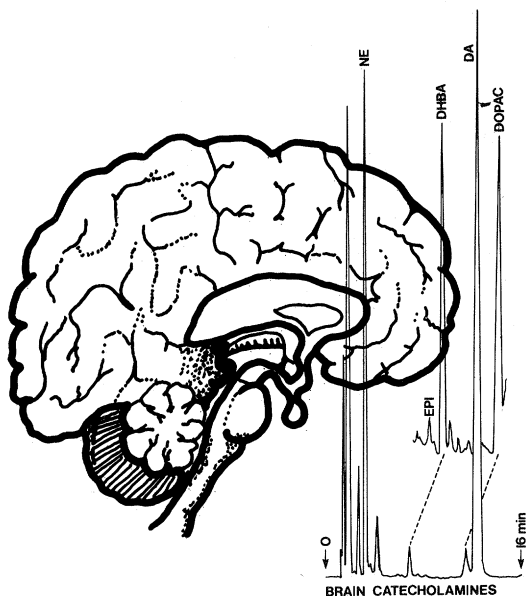
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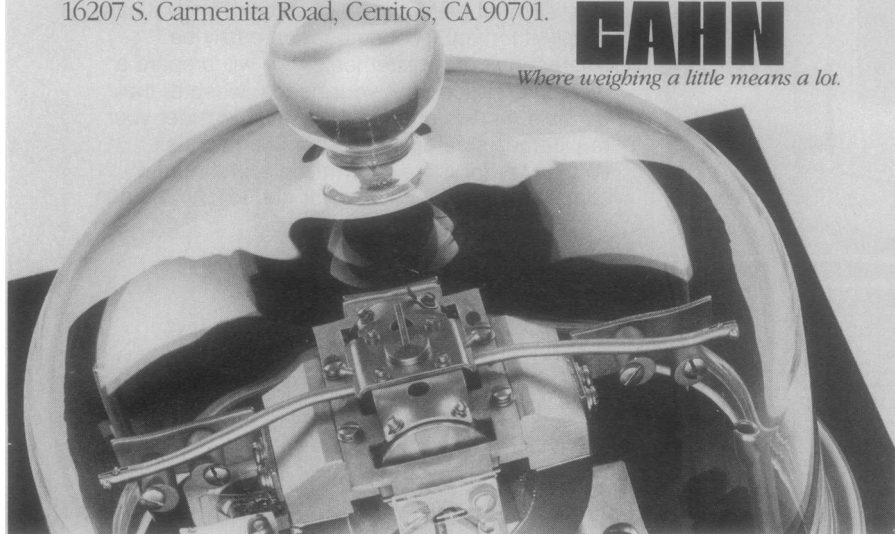
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By 30 October 1983, send resume, names of three confidential references, salary requirements and indication of appointment availability to: **Dr. Jack R. Van Lopik, Dean, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803-7500. Phone: 504/388-1558 or 6710.** Louisiana State University is an Equal Opportunity Employer.

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Physical Methods in Modern Chemical Analysis. Vol. 3. Theodore Kuwana, Ed. Academic Press, New York, 1983. xii, 354 pp., illus. \$49.50.

Physics in Collision. High-Energy ee/ep/pp Interactions. Vol. 2. Proceedings of a conference, Stockholm, June 1982. Per Carlson and W. Peter Trower, Eds. Plenum, New York, 1983. x, 432 pp., illus. \$62.50.

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Probleme und Resultate der Wissenschaftstheorie und Analytischen Philosophie. Band 1, Erklärung, Begründung, Kausalität. Wolfgang Stegmüller. Springer-Verlag, New York, ed. 2, 1983. xx, 1116 pp. \$99.20.

Problems of the Keimbahn. New Work on Mammalian Germ Cell Lineage. Papers from a symposium, Hamburg, Oct. 1981. W. Hilscher, Ed. Karger, Basel, 1983. viii, 128 pp., illus. \$58.75. Bibliotheca Anatomica, No. 24.

Proceedings: Symposium on Monitoring and Assessment of Airborne Pollutants with Special Emphasis on Long-range Transport and Deposition of Acidic Materials and Workshop on Air and Precipitation Monitoring Networks. Ottawa, Aug. 1982. R. C. Pierce, D. M. Whelpdale, and M. G. Sheffer, Eds. National Research Council Canada, Ottawa, 1983. 502 pp., illus. Paper, \$8.

The Production and Application of Fluorescent Brightening Agents. Miloš Zahradník. Translated from the Czech by Želimir Procházka. Wiley-Interscience, New York, 1983. 148 pp., illus. \$29.95.

Programming the IBM Personal Computer: FORTRAN 77. Robert A. Rouse and Thomas L. Bugnitz. Holt, Rinehart and Winston, New York, 1983. xvi, 240 pp. Paper, \$16.95. IBM Personal Computer Series.

Progress in Materials Science. Vol. 27. J. W. Christian, P. Haasen, and T. B. Massalski, Eds. Pergamon, New York, 1983. vi, 460 pp., illus. \$130. Previously published as *Progress in Materials Science*, vol. 27, Nos. 1-4.

Proteins in Biology and Medicine. Papers from a conference, Shanghai, May 1981. Ralph A. Bradshaw and five others, Eds. Academic Press, New York, 1982. xviii, 420 pp., illus. \$31.50.

Psychology and People. A Tutorial Text. Antony J. Chapman and Anthony Gale. Macmillan, London, 1982. xvi, 528 pp. Cloth £15; paper, £6.95. Psychology for Professional Groups.

The Psychology of Human-Computer Interaction. Stuart K. Card, Thomas P. Moran, and Allen Newell. Erlbaum, Hillsdale, N.J., 1983. xvi, 470 pp., illus. \$39.95.

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Amy Stromsten. Rutgers Center of Alcohol Studies, New Brunswick, N.J., 1982. xii, 144 pp., illus. \$20.

Renewable Energy. The Power to Choose. Daniel Deudney and Christopher Flavin. Norton, New York, 1983. xvi, 432 pp. \$18.95. A Worldwatch Institute Book.

Skin Painting Techniques and in vivo Carcinogenesis Bioassays. Papers from a workshop, Arlington, Va., Nov. 1981. F. Homburger, Ed. Karger, Basel, 1983. vi, 312 pp., illus. \$131.75. Progress in Experimental Tumor Research, vol. 26.

Structure and Dynamics. Nucleic Acids and Proteins. Proceedings of a symposium, La Jolla, Calif., Sept. 1982. Enrico Clementi and Ramaswamy H. Sarma, Eds. Adenine Press, Guilderland, N.Y., 1983. xii, 488 pp., illus. \$49.

Students Structural Handbook. W. Morgan. Revised by B. G. Fletcher and S. A. Lavan. Butterworths, Boston, ed. 3, 1983. viii, 88 pp., illus. Paper, \$17.50.

Studies in Adaptation. The Behavior of Higher Crustacea. Steve Rebach and David W. Dunham, Eds. Wiley-Interscience, New York, 1983. xviii, 282 pp., illus. \$42.50.

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Solar Energy. J. C. McVeigh. Pergamon, New York, ed. 2, 1983. xii, 260 pp., illus. Paper, \$15.

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The Department of Veterinary Pathobiology, University of Illinois, College of Veterinary Medicine, invites applications for an **ASSISTANT PROFESSOR** position (tenure track) in **veterinary parasitology.** The candidate should have a D.V.M./Ph.D. or Ph.D. degree with evidence of training or experience in veterinary parasitology. Duties include teaching parasitology to veterinary and graduate students and development of a strong research program. Special consideration will be given to applicants whose research interests complement existing programs. Research in the department is conducted in microbiology, immunology, pathology, preventive medicine, public health, epidemiology, and parasitology. Salary is negotiable. Inquiries, including a letter of application, curriculum vitae, and three references, should be sent to: **Dr. Kenneth S. Todd, Jr., Chair, Search Committee, Department of Veterinary Pathobiology, College of Veterinary Medicine, 2001 South Lincoln Avenue, University of Illinois, Urbana, Ill. 61801; telephone: 217-333-4689.** To ensure full consideration, applications must be received by 31 January 1984; starting date as soon as possible thereafter.

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ASSISTANT PROFESSOR, interested in calcium homeostasis, metabolic regulation, and calcium channel blockers in sepsis; working with hepatocytes and adipocytes. Experience with mitochondria, membrane biochemistry, and dual wavelength spectrophotometer preferred. Competitive salary (partially derived from grant funds), travel, technical assistance, and stimulating environment. Send curriculum vitae to: **John J. Spitzer, M.D., Head, Department of Physiology, Louisiana State University Medical Center, 1901 Perdido Street, New Orleans, La. 70112.**

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Applications are invited for a tenure-track position in the Division of Marine and Atmospheric Chemistry. Candidates should have experience in the application of chemical and isotopic tracers to the study of oceanic mixing and transport processes and in the modeling of these processes. Candidates should have a Ph.D. and a background in marine chemistry and physical oceanography. Faculty are expected to teach graduate and undergraduate courses and to support and carry out an active research program.

Submit curriculum vitae and names of three references by 1 December 1983 to: **Dr. H. Gote Ostlund, Chairman of the Search Committee, Division of Marine and Atmospheric Chemistry, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149-1098.**

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Applicants must have a Ph.D. degree or equivalent in physiology, pharmacology or a related biological science and a minimum of three years of progressively responsible professional experience. At least one year of experience must be comparable in difficulty and responsibility to the next lower level in the Federal Service. Demonstrated research experience is preferred. Equivalent combinations of professional experience and graduate education may be acceptable.

Interested persons should submit a Standard Form 171, Personal Qualifications Statement (available at Federal Job Information Centers or from the address below), to:

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and Associate Director for Kidney, Urologic, and Hematologic Diseases (dual positions)

The National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases invites nominations and applications for the position of Director, Division of Kidney, Urologic, and Hematologic Diseases (KUHD). The candidate must be internationally recognized within the scientific community as an authority in kidney diseases. In addition, the candidate should demonstrate an interest and a commitment to urologic and hematologic diseases. This Institute conducts, fosters, and supports research and research training in the prevention, management, and cure of arthritis, and related bone and skin diseases, diabetes and related endocrine and metabolic diseases; kidney, urologic and hematologic diseases, and digestive diseases. Programs encompass intramural laboratory research and extramural (grants and contracts) activities in fundamental arthritis, diabetes, digestive and kidney disorders.

The Director, serves as the primary official with responsibility for planning and executing the Institute's extramural programs in kidney, urologic, and hematologic diseases, including: basic and applied research, training fellowships and institutional training awards, multipurpose centers of research, clinical trials, technological development and application of research findings; and collection and dissemination of reliable data and information, budget development, and advising and participating with outside voluntary health organizations and the National Advisory

Council in identifying and assessing the needs and requirements for research and manpower development in categorical diseases. Additionally, the incumbent serves as principal advisor to the Institute Director on matters and policies pertaining to these areas. Also, the incumbent will conduct intramural research projects in the areas of kidney and related diseases.

This is a Civil Service position in the Senior Executive Service (SES), with a salary range from \$56,945 to \$63,800 per annum, depending on qualifications. Currently the payable salary is limited to \$63,800. Physicians may be eligible for an additional comparability allowance up to \$10,000 per year. (Alternatively, candidates may be eligible for appointment in the Commissioned Corps of the U.S. Public Health Service). Mandatory professional/technical qualifications are a medical degree, or Ph.D. degree in a health or health related science (or equivalent) and research program administration and/or clinical experience in kidney diseases. Further information on these qualifications are available by contacting Syd Carter, Personnel Management Specialist, National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases, Building 31, Room 9A34, Bethesda, Maryland 20205, (301) 496-4231.

Mandatory managerial/executive qualifications include evidence of management of a basic or clinical research program, demonstrating ability to assume leadership

responsibilities in developing program goals; representing the program to outside groups; directing program planning, execution, and evaluation; and conducting a fair and equitable employment program, including the attainment of EEO objectives.

Candidates who meet the mandatory qualifications will be further evaluated by the Search Committee on the degree to which they exceed the mandatory managerial/executive qualifications, and on the following desirable qualifications: scientific reputation/peer recognition, training and education, leadership of a basic or clinical research or research administration program, and honors and awards.

APPLICATIONS (PERSONAL QUALIFICATIONS STATEMENT SF-171) should be sent to Mr. Clifford Moss, Executive Secretary, Search Committee for Director, KUHD, Building 31, Room 9A34, National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases, Bethesda, Maryland 20205, telephone (301) 496-4231. All applications must be postmarked before November 30, 1983.

A current curriculum vitae and bibliography must accompany all applications. Applications from women and/or minority group members are especially solicited. Department of Health and Human Services Public Health Service National Institutes of Health National Institute of Arthritis, Diabetes, Digestive and Kidney Diseases

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Dr. Robert P. Geyer
Department of Nutrition
Harvard School of Public Health
665 Huntington Avenue
Boston, Massachusetts 02115

Expression of interest is particularly invited from qualified women and minority candidates. *Harvard University is an Equal Opportunity/Affirmative Action Employer.*

THE DEPARTMENT OF BIOCHEMISTRY, CORNELL UNIVERSITY MEDICAL COLLEGE, invites applications for a position of **ASSISTANT PROFESSOR.** Candidates should have a strong background in biochemistry and molecular biology and will be expected to establish a strong independent research program. Other duties include teaching of medical students and the supervision of graduate students. Women and minority candidates are encouraged to apply. Send detailed curriculum vitae, list of publications and research support, and a brief statement of research interests before 1 December 1983 to: **Search Committee, Department of Biochemistry, Cornell University Medical College, 1300 York Avenue, New York, New York 10021.** Three letters of recommendation should also be sent. *Cornell University Medical College is an Equal Opportunity/Affirmative Action Employer.*

ASSISTANT PROFESSOR—Tenure-track position in anatomy department beginning July 1984. Candidates should have Ph.D. with postdoctoral research experience and ability to obtain or already have extramural grant support. Research interest in cell biology desired, especially in areas such as membrane structure and function. Individuals will participate in teaching in one of the areas of anatomy and ultimately will develop a graduate course in their area of expertise. Superb research facilities available in new building. Send curriculum vitae, brief statement of research interests and names of three references by 15 December to:

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ASTRONOMERS/ASTROPHYSICISTS—NATIONAL RADIO ASTRONOMY OBSERVATORY (NRAO): NRAO will have tenure-track positions at the assistant and associate scientist levels (equivalent to assistant and associate professor) for observers or theorists with research interests in radio astronomy or other areas of astrophysics related to the Observatory's current programs. More senior appointments could be made in exceptional cases. NRAO has an extensive staff of astronomers and engineers engaged in all aspects of radio astronomical research, encompassing the millimeter to meter wave spectrum and including single dish and aperture synthesis continuum and spectroscopic techniques. Its major instruments are the Very Large Array near Socorro, New Mexico, a 12-m millimeter wave telescope on Kitt Peak, Arizona, and 140-foot and 300-foot telescopes at Green Bank, West Virginia. Design studies for a very long baseline array are in progress. Up-to-date facilities for data analysis are available. Women and minorities are especially encouraged to apply for these positions. Please send a curriculum vitae, bibliography, and the names of three persons who may be contacted for references to: **Dr. Alan H. Bridle, Chairman, Search Committee, National Radio Astronomy Observatory, Edgemont Road, Charlottesville, Va. 22901.** Applications will be considered until 1 February 1984.

POSITIONS OPEN

BIOCHEMISTRY

Assistant professor, Department of Biochemistry, Brandeis University. This is a tenure-track position; the field of interest is open. Send résumé, a brief research proposal, and names of three references to: **Dr. William P. Jencks, Department of Biochemistry, Brandeis University, Waltham, Mass. 02254-9110.** *Brandeis University is an Equal Opportunity/Affirmative Action Employer.*

FACULTY POSITION DEPARTMENT OF BIOCHEMISTRY UNIVERSITY OF SHERBROOKE SCHOOL OF MEDICINE

Biochemist. A faculty position is available in the Department of Biochemistry at the assistant professor level. Applicants should have a Ph.D. degree in biochemistry with postdoctoral experience in the area of molecular biology. Knowledge of French is desirable. The successful candidate is expected to develop a strong independent research program and to obtain independent salaried support from Canadian or Québec scholarship programs. Teaching duties will include participation in courses at the undergraduate and graduate levels in the Department of Biochemistry.

Applicants must provide curriculum vitae, summary of research interests, and three letters of reference no later than 31 December 1983. Applications should be sent to: **Dr. J.-G. Lehoux, Directeur, Département de Biochimie, Université de Sherbrooke, Sherbrooke, Québec, Canada, J1H 5N4.**

In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and landed immigrants of Canada.

BIOLOGY

Applications are invited for tenure-track positions for a physiologist and an ecologist beginning fall 1984. The successful candidates must have a Ph.D. and are expected to teach a one-semester upper-division course with laboratory in their specialty (comparative animal physiology or general ecology), a biology course for nonscience majors to satisfy a college science distribution requirement, and the invertebrate zoology portion with laboratory of our introductory course for freshman biology majors. Research area is open.

Candidates should have a strong commitment to undergraduate teaching and to developing a research program that can involve undergraduates. Rank and salary are open and depend on qualifications and experience. To apply, send curriculum vitae, a concise statement of research and teaching interests and plans, and names and addresses of three referees by 22 November 1983 to: **Dr. Kornath Madhavan (for physiologist) or Dr. William R. Healy (for ecologist), Search Committee Chair, Department of Biology, College of the Holy Cross, Worcester, Mass. 01610.**

The College of the Holy Cross, a Jesuit Liberal Arts College, is an Equal Opportunity/Affirmative Action Employer.

CHAIRMAN—DEPARTMENT OF PHYSIOLOGY. Texas Tech University Health Sciences Center is accepting applications for the chairman of physiology; candidates must be experienced in the needs of a medical school curriculum, in teaching, in research, and departmental administration. Applications from interested candidates should be sent to: **James Price, M.D., Ph.D., Chairman of the Physiology Search Committee, Department of Ophthalmology and Visual Sciences, Texas Tech University Health Sciences Center, Lubbock, Texas 79430.** Applications should be received within 2 months of the date of this announcement. *An Equal Opportunity Employer.*

BIOLOGY DEPARTMENT CHAIRPERSON

The Department of Biology invites applications and nominations for an established biologist to serve as chairperson. The successful candidate must hold an earned doctorate in biological science and must be an energetic leader who will aid the department in maintaining and expanding its undergraduate and graduate programs. The University of Texas at Arlington is the second largest university in the UT system with an enrollment of about 23,000 students. Desired starting date is August 1984. Applicant should send curriculum vitae with complete bibliography, a statement of administrative philosophy, and the names, addresses and telephone numbers of four references by 1 December 1983 to: **Search Committee, Department of Biology, Post Office Box 19498, The University of Texas at Arlington, Arlington, Texas 76019.**

The University of Texas at Arlington is an Equal Opportunity/Affirmative Action Employer.

POSITIONS OPEN

BIOLOGIST to teach genetics, introductory bacteriology, and medical bacteriology. This is a sabbatical replacement position for the 1984 spring semester beginning 10 January 1984, with a possible 1-year extension depending on background. A Ph.D. is preferred. Send letters of application, three letters of recommendation, and all transcripts to: **Dr. Melvin Denner, Chairman, Division of Science and Mathematics, Indiana State University Evansville, Evansville, Ind. 47712.** Closing date on completed applications is 10 November 1983. *Indiana State University Evansville is an Affirmative Action/Equal Opportunity Employer.*

CHAIRMAN, COMPUTER AND ELECTRONICS DEPARTMENT

The Armed Forces Radiobiology Research Institute is seeking an individual to serve as chairman of the Computer and Electronics Department. This Institute, a command of the Defense Nuclear Agency, is the principal radiobiology research laboratory for the Department of Defense. The chairman supervises approximately 25 employees involved in instrumentation design, software design, and biomedical and electronic equipment maintenance. The chairman is responsible for directing the design and development of electronic and computer devices which advance radiobiology research; for developing advanced equipment for the capture, conversion, and transmission of data; and for designing instrumentation systems. Mandatory qualifications include knowledge of high-level programming languages, hardware interfacing, instrumentation system design, principles of software engineering, and management experience. A desirable qualification is a Ph.D. in a physical, biological, or computer science. This Civil Service position is available immediately. Salary ranges from \$41,277 to \$53,661. Direct inquiries to: **Vince Ackermann at 202-295-1426.** Submit application, including SF-171 and curriculum vitae, by 30 November 1983 to: **The Armed Forces Radiobiology Research Institute, Civilian Personnel Office, Bethesda, Md. 20814.** Reference: announcement number 43/83. *An Equal Opportunity Employer.*

The University of Western Ontario Faculty of Medicine CHAIRMAN Department of Physiology

Applications are invited for the position of chairman of the Department of Physiology, The University of Western Ontario, London, Ontario, Canada. The department, actively involved in education and research, consists of 16 full-time faculty members and 17 part-time members. The department has strong research interests in the cardiovascular and neuroscience fields and is a partner in an MRC Group in reproductive biology. The position requires an individual with strong leadership and administrative skills, a commitment to academic excellence, and a distinguished record of research and teaching.

Applications should be sent by 1 December 1983, to:

Dr. M. J. Hollenberg,
Dean, Faculty of Medicine,
The University of Western Ontario,
Health Sciences Centre,
London, Ontario, Canada N6A 5C1

In accordance with Canadian immigration requirements this advertisement is directed to Canadian citizens and permanent residents. *The University of Western Ontario is an Equal Opportunity Employer.*

COMPARATIVE VERTEBRATE PHYSIOLOGIST UNIVERSITY OF CALIFORNIA, IRVINE

The Department of Developmental and Cell Biology is recruiting for a position in comparative vertebrate physiology at the assistant or beginning associate professor level. Fields of interest include respiratory physiology, muscle physiology, adaptational biochemistry, and comparative endocrinology. The candidate is expected to establish a productive research program and to participate in an ongoing program of graduate teaching responsibilities in vertebrate physiology. The candidate must have Ph.D. degree and postdoctoral experience is desired. Applicants should submit a curriculum vitae with copies of publications and should request that three letters of recommendation be sent to: **Chair, Comparative Physiology Search Committee, Department of Developmental and Cell Biology, University of California, Irvine, Calif. 92717.** Deadline for receipt of the applications is 30 November 1983. *The University of California is an Affirmative Action/Equal Opportunity Employer.*

RESEARCH TOXICOLOGIST

Battelle Columbus Laboratories' Toxicology Program Office in Vienna, Virginia, currently has an excellent career opportunity available for an experienced toxicologist. We are a world leader in contract research and a prime contractor to the National Cancer Institute for the preclinical toxicology of antineoplastic drugs. We are seeking an individual at the principal research scientist level to assume responsibility for the design and development of protocols, coordination of work at various laboratories, data analysis and interpretation, and interaction with all levels of research sponsors. You may also interact with the Food and Drug Administration (FDA) on our sponsor's behalf.

Our requirements for this challenging position include a Ph.D. in toxicology with at least 2 years of experience beyond the Ph.D. which includes laboratory work in preclinical toxicology, a working knowledge of GLP's and the preparation and submission of reports to the FDA. Specific experience with antineoplastics is desired.

Battelle offers a competitive starting salary, excellent employee benefits and opportunities for career growth. To be considered for this **non-laboratory position** located in **Vienna, Virginia**, please send your résumé with **publication history** to: Carole Paquin, Employment Department P-3



Battelle

Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201



SYNERGEN

FERMENTATION RESEARCH AND DEVELOPMENT

SYNERGEN is building a modern fermentation laboratory completely equipped for bench and pilot scale production and recovery. Fermenters will be completely instrumented with computer monitoring and control capability. Candidates for positions in this facility must have a Ph.D. in chemical or biochemical engineering, plus two years of experience in process development or production. Candidates must be willing to work with genetic engineers, biochemists, and microbiologists in developing new fermentations.

SYNERGEN is located in Boulder, Colorado. At present, more than 50 people are engaged in research directed toward the production of pharmaceuticals, animal health care products, and bulk and specialty chemicals. We offer competitive salaries, generous fringe benefits, a work environment that is scientifically cooperative, a beautiful town, mountains, and a challenging opportunity for those interested in enjoying the climb to the top.

Please send resumes to:

**Director of Recruitment
SYNERGEN ASSOCIATES, INC.
1885 33rd Street
Boulder, CO 80301**

NATIONAL RESEARCH COUNCIL
National Academy of Sciences National Academy of Engineering Institute of Medicine

RESIDENT RESEARCH ASSOCIATESHIPS



1984

TENABLE AT THE

**Fire Control and Small Caliber Weapon
Systems Laboratory**

Large Caliber Weapon Systems Laboratory

LOCATED AT DOVER, NEW JERSEY

AND THE

Ballistic Research Laboratory

Chemical Systems Laboratory

**LOCATED AT ABERDEEN PROVING GROUND,
MARYLAND**

These NRC-ARRADCOM Research Associateships are awards which provide opportunities for research on problems of individual choice to scientists and engineers of unusual ability and promise. Programs are open to U.S. citizens only; awards are on a competitive basis. Initial awards are for one year with the possibility of renewal.

The National Research Council is accepting applications for its 1984 Resident Research Associateships that will provide opportunities for postdoctoral and senior scientists to conduct experimental and theoretical research in the areas of:

- APPLIED MATHEMATICS
- PROBABILITY THEORY
- STOCHASTIC PROCESSES
- ATMOSPHERIC PHYSICS
- COMBUSTION RESEARCH
- FLUID MECHANICS
- MATERIALS SCIENCES
- NUCLEAR & RADIATION PHYSICS
- ORGANIC CHEMISTRY
- PHYSICAL CHEMISTRY
- SURFACE CHEMISTRY
- KINETICS
- COMPUTER SIMULATION
- ELASTIC—PLASTIC STRAIN & INTERNAL STRESS
- GUIDED WAVE TECHNOLOGY
- MECHANISMS OF HIGH STRENGTH ALLOYS
- ENZYMATIC DETERRENTS

DEADLINES:

Applications must be postmarked on or before **January 15, 1984**. Supporting documents must be received by **February 1, 1984**. Awards will be announced in early **March 1984**.

FOR INFORMATION, WRITE TO:

ASSOCIATESHIP PROGRAMS (JR610—E1)

**NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue, N.W. Washington, DC 20418**



SYNERGEN ASSOCIATES, INC. is seeking one or more:

- **MOLECULAR BIOLOGISTS**, particularly adept at cloning and expression in prokaryotes. Candidates should have proficiency at identifying rare clones among a population of plaques or colonies, and strong backgrounds in genetics.
- **MICROBIOLOGISTS**, interested in collaborating with molecular biologists and biochemists. Studies are focused on anaerobes and thermophiles, as well as the more common Pseudomonads. Synergen specializes in the search for novel biochemical pathways; a major effort has yielded a proprietary technology that isolates and identifies microbes that are capable of preselected bioconversions. Candidates should understand the logic and control of metabolic pathways.
- **IMMUNOLOGISTS**, ready to join molecular biologists and protein chemists in the development of health care products. The candidates should have a deep curiosity about problems of protein folding, structure, and function. Respondents should be interested in the uses of antibodies for protein purification, and as probes for protein conformation.
- **PROTEIN CHEMISTS** to participate in several projects concerned with protein structure and function. Expertise in the modern methods of purification and sequencing of proteins is essential along with the ability to direct and maintain a state-of-the-art facility.

SYNERGEN is located in Boulder, Colorado. At present, more than 50 people are engaged in research directed toward production of human and animal health care products, as well as specialty and bulk chemicals. The atmosphere is scientifically demanding. The town is an extraordinarily pleasant place to live, filled with urban diversions, and close to spectacular mountain settings. Synergen offers competitive salaries, generous fringe benefits, and the stability required to enjoy high level research. Synergen is seeking both recent Ph.D.'s with postdoctoral experience and more senior people, interested in the challenge and excitement afforded by rapid scientific growth. If you are a person of stamina, intelligence, and good spirits, send your CV and the names of three references to:

Recruitment Director
SYNERGEN ASSOCIATES, INC.
1885 33rd Street
Boulder, CO 80301

POSITIONS OPEN

CLINICAL PATHOLOGY. The Department of Pathology at University of California, Los Angeles School of Medicine has positions available for director of blood bank and director of microbiology and for junior faculty positions in hematopathology and clinical chemistry to begin on or before 1 July 1984. Qualifications include an M.D. degree, certification in clinical or specialty pathology or equivalent experience, demonstrated research ability, and potential for development of an independent research program. Applications, including curriculum vitae, summary of research interests, and names and addresses of four references, should be sent to: **P. A. Cancilla, M.D., Chairman, Department of Pathology, UCLA School of Medicine, Los Angeles, California, 90024.** *UCLA is an Equal Opportunity/Affirmative Action Employer. Minority and women candidates are encouraged to apply.*

COMPARATIVE PHYSIOLOGY

The Department of Zoology, University of Florida, has a tenure-track position available for an assistant or associate professor whose field of research is **COMPARATIVE PHYSIOLOGY OR AMPHIBIANS AND/OR REPTILES.** Individuals who are interested in an evolutionary, behavioral, and/or ecological approach are preferred. The department is determined to maintain close contact between its developing program in ecological physiology and its traditional strengths in ecology, behavior, and evolutionary zoology. The successful candidate will be expected to contribute to teaching in the undergraduate program, will be encouraged to develop a graduate course of his/her choosing, and will be expected to develop an effective research program. Appropriate research interests include such topics as gas exchange, behavioral temperature regulation, energy budgets, and water and salt balance. Candidates must submit a curriculum vitae, a statement of research interests, a selected set of recent publications, and the names, addresses, and phone numbers of at least three references by 10 December 1983 to:

Dr. Martha Crump
Physiology Search Committee
Department of Zoology
University of Florida
Gainesville, Fla. 32611

DEAN—COLLEGE OF PHARMACY

The University of Nebraska Medical Center (UNMC) is seeking nominations/applications for the position of dean of the College of Pharmacy. Five colleges, one school, three institutes, and one hospital comprise the medical center. The College of Pharmacy offers the Doctor of Pharmacy degree as its sole professional degree. The Departments of Biomedical Chemistry, Pharmaceutics and Pharmacodynamics and Toxicology offer Master's and/or Ph.D. degree programs. Graduates of an accredited college of pharmacy are preferred. Applicants should send a letter of interest, a current curriculum vitae, and the names of three references to:

Dr. W. O. Berndt
Dean, Graduate Studies
University of Nebraska Medical Center
42nd Street and Dewey Avenue
Omaha, Nebraska 68105

The date for receipt of nominations/applications is 15 November 1983. *UNMC is an Equal Opportunity/Affirmative Action Employer.*

DEVELOPMENTAL BIOLOGY. One-semester (spring 1984) position to teach developmental biology and to participate on a limited basis in a freshman level course (genetics and development). Starts 1 February 1984. Ph.D. preferred, ABD considered. Applicants should submit letter of application, résumé, transcripts, and two letters of recommendation to: **Chairman, Biology Department, Bucknell University, Lewisburg, Pa. 17837** by 1 November 1983. *Affirmative Action/Equal Opportunity Employer.*

DIRECTOR OF SCIENTIFIC AFFAIRS

The American Lung Association, a voluntary health agency with state and local affiliates, seeks an individual to provide scientific and medical counsel to its programs and publications. The director will have a close relationship with the organization's prestigious medical section, the American Thoracic Society. Applicants must have a medical or doctoral degree in science and experience in pulmonary medicine or related field. This leadership position is located at national headquarters in New York City and is preferably full-time. Salary is negotiable. Apply to: **Dr. Robert Mellins, American Lung Association, 1740 Broadway, New York, N.Y. 10019.**

POSITIONS OPEN

DEAN THAYER SCHOOL OF ENGINEERING DARTMOUTH COLLEGE

Nominations and applications are invited for the position of dean of the Thayer School of Engineering at Dartmouth College. The dean is responsible for the academic, administrative, and financial leadership of the school and will oversee a major expansion in the faculty, facilities, and graduate programs during the next several years.

The Thayer School of Engineering is responsible for the undergraduate engineering science major within the faculty of Arts and Sciences and for programs at the B.E., masters, and doctoral levels. Areas of research strength include biomedical, computer, electrical and mechanical engineering, materials science, and cold regions science and engineering. A commitment to interaction with industry is fostered through the Cook Engineering Center.

Candidates should hold a doctoral degree in engineering or a related field, qualify for a tenured position at the full professor level, and have experience in teaching, research, and administration. Applications requested by 1 January 1984 for appointment beginning 1 July 1984. Nominations and applications should be sent to:

Dean Search Committee
Office of the Provost
Parkhurst 102
Dartmouth College
Hanover, N.H. 03755

Dartmouth College is an Affirmative Action/Equal Opportunity Employer.

DEPARTMENT HEAD BIOCHEMISTRY, MICROBIOLOGY, MOLECULAR AND CELL BIOLOGY

Applications and nominations are invited for the headship of the Department of Biochemistry, Microbiology, and Molecular and Cell Biology (BMMCB) at The Pennsylvania State University at University Park. Administrative and teaching experience desirable. Outstanding research ability and records of accomplishment required. The department has 32 faculty members who are active in a variety of research areas including enzymology, regulation, molecular genetics, immunology, and biotechnology. Interested biological scientists should send a résumé including research interests and list of publications by 1 November 1983. Preliminary inquiries are encouraged. Contact: The Chairman, Search Committee for BMMCB Department Head, The Pennsylvania State University, Box B, 152 Davey Laboratory, University Park, Pa. 16802; telephone 814-865-1209. An Equal Opportunity/Affirmative Action Employer.

FACULTY POSITION IN BIOPHYSICS

The Department of Physics at Syracuse University has a tenure-track position available in biophysics at the assistant professor level. Candidates with demonstrated research experience in biophysics should send their résumé and three letters of recommendation to: Professor F. Rohrlach, Chairman of the Search Committee, Department of Physics, Syracuse University, Syracuse, N.Y. 13210. Affirmative Action/Equal Opportunity Employer.

FACULTY POSITION, CHEMISTRY. Applications are invited for a tenured senior appointment in the Department of Chemistry at Stanford University with primary teaching responsibility in organic chemistry. Applicants must have outstanding research credentials and a strong commitment to teaching undergraduates as well as graduates. In applying, send curriculum vitae and bibliography to: Professor John Ross, Chairman, Department of Chemistry, Stanford University, Stanford, California 94305. Stanford is committed to Equal Opportunity through Affirmative Action in employment and we are especially eager to identify women and minority persons with appropriate qualifications. Applications should be received by 30 November 1983.

GENETICS AND MICROBIOLOGY. Assistant Professor, Ph.D., for tenure-track position to teach genetics and microbiology, with preference to candidates qualified to address the cellular and molecular aspects of those subjects; participation in introductory biology courses. Nine-month appointment, liberal fringe. Send résumé, three letters of recommendation, and recent reprint to: Prof. Irving Fishman, Department of Biology, Grinnell College, Post Office Box 805 Grinnell, Iowa 50112-0806, before 1 January 1984. An Equal Opportunity/Affirmative Action Employer.

Cell and Molecular Biology FACULTY POSITIONS

Faculty level positions are becoming available at the Worcester Foundation for Experimental Biology. The major criteria in this search are scientific excellence and collegial qualities.

At present, the faculty and their areas of interest are:

Earl Baril—Enzymology of eukaryotic DNA replication
Edward Berger—Cell-cell recognition and control of gene expression by cell-cell contact in *Dictyostelium*
William Crain—Structure and developmental expression of sea urchin actin genes
Charles Glabe—Gamete interactions and sperm adhesion
Grant Fairbanks—Membrane proteins, regulation of erythrocyte shape and volume
Jay Greenberg—Messenger RNA-binding proteins and control of protein synthesis
Thor Pederson—Nuclear ribonucleoproteins and messenger RNA processing
Harriet Robinson—Avian retroviruses; oncogenes
Greenfield Sluder—Timing and molecular control of mitotic events during early development

David Steffen—Murine leukemia virus gene expression and oncogenicity
Richard Vallee—Microtubule-associated proteins; mitosis, neuronal cytoskeleton, monoclonal antibodies
Samuel Wadsworth—Gene expression during development in *Drosophila*
Robert Wehling—Actin and actin-associated proteins in relation to cytoskeleton organization
David Wolf—Control of lateral organization and motion of membrane components
George Witman—Mechanism and control of flagellar motility in *Chlamydomonas*
Paul Zamecnik—Nucleotide-enzyme interactions involved in DNA replication
Carol Ziomek—Membrane structure and cell polarity in early mouse development

We hope to make at least two appointments in the next 18 months. These positions can be filled at either junior or senior faculty rank. Send C.V. and description of research interests to Dr. Thor Pederson, Cell Biology Group, C/O PERSONNEL OFFICE, Worcester Foundation for Experimental Biology, 222 Maple Avenue, Shrewsbury, MA 01545

An Equal Opportunity/Affirmative Action Employer



WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY

SENIOR SCIENTIST / PROJECT SCIENTIST

M.S./Ph.D. in Mechanical Engineering, Physics, Aerodynamics or related field of study with two years experience in experimental fluid or gas dynamics. Will conduct experiments to characterize the flow patterns of trace gases in the mammalian respiratory tract. Will be responsible for designing and constructing a laboratory system in which the fluid dynamics and absorption characteristics of the respiratory tracts are simulated. Familiarity with gas analyzers and continuous monitoring instrumentation helpful. Send salary history and present salary requirement in confidence.

SENIOR SCIENTIST / PROJECT SCIENTIST

M.S./Ph.D. in Physical Chemistry or closely related area. An undergraduate degree in engineering or a curriculum where the candidate received training in fluid dynamics and heat transfer analysis is preferred, plus at least two years of work experience in an aerosol physics related field. Will perform experimental measurements of the hygroscopic growth rates of particulate matter of health effects concern. Will be responsible for constructing a laboratory system in which the fluid dynamics and environment (temperature and relative humidity) of the human respiratory tract are simulated. Will operate instrumentation necessary to generate and characterize the monodisperse aerosols upon which the hygroscopic measurements will be conducted. A candidate familiar with laboratory equipment common to aerosol science investigations is preferred. Typical devices are monodisperse aerosol generators (spinning top and/or vibrating orifice instruments), and optical particle-sizing instruments, and associated electronic equipment (multi-channel analyzer). The research may involve the use of a laser particle sizing system. This may involve the development of such a system if commercially available instrumentation is not suitable. Send salary history and present salary required in confidence to:

Glenda W. Jahtaniah
NORTHROP SERVICES, INC.
P.O. Box 12313, Research Triangle Park, NC 27709

An Equal Opportunity Employer

POSITIONS OPEN

DIRECTOR OF WOMEN'S STUDIES STATE UNIVERSITY OF NEW YORK AT ALBANY

Three year tenure-track position as director of women's studies. Requires Ph.D. and publications, teaching experience in women's studies, demonstrated administrative experience, and commitment to women's issues. Assistant or associate professor level. Particular interest in candidates in the following fields: psychology, anthropology, biology, Afro-American studies, Puerto Rican and Caribbean studies, economics, or political science. But candidates in all fields, including those with interdisciplinary degrees in women's studies, may apply.

In addition to teaching three courses per year, the director is responsible for planning, generating, and publicizing women's studies courses; advising students; organizing campus and community programs concerning women; and working with other campus women's organizations on issues of mutual concern. The director works with and is responsible to an advisory committee of faculty, students, staff, and community women.

Starting date: September 1984. Salary commensurate with qualifications and experience. Apply by 15 November 1983 to:

Dr. Iris Berger
Director of Women's Studies
HU-245
State University of New York
1400 Washington Avenue
Albany, New York 12222

ECOLOGIST

ASSISTANT PROFESSOR. Tenure-track position available 1 January 1984 with appointment to 30 June 1985. Hamilton College seeks a biologist to teach introductory biology (emphasis on animal organization and physiology) in the spring term and ecology in the fall term. Candidate sought preferably with Ph.D., teaching experience, and demonstrated interest in undergraduate education and expect to maintain an active research program that will involve undergraduates. Applications should be received by 10 November and include curriculum vitae, transcripts, the names of three references. Send résumé to: **Prof. E. C. Putala, Chairman, Biology Department, Hamilton College, Clinton, N.Y. 13323.**

Hamilton College is an Equal Opportunity Employer. Women and members of minority groups are strongly encouraged to apply.

FERMENTATION ENGINEER

Mycogen Corporation, an innovative biotechnology company concentrating on the development of microbial pesticides, has a position available for a fermentation specialist. Duties include fermentation process development, bench and pilot-scale work, scale up plus technical support of manufacturing operations. Background in fermentation and sporulation of filamentous fungi and previous industrial experience is highly desirable. Mycogen offers competitive salaries, exceptional working conditions and equity participation for key employees. Application can be made by sending a curriculum vitae complete with names of references to:

David L. Edwards
Director of Research
Mycogen Corporation
5451 Oberlin Drive
San Diego, Calif. 92121

INSTITUTE DIRECTOR. The Institute for Medical Research of Bennington (IMRB) invites applications for director. IMRB is a small non-profit corporation conducting basic research with emphasis on cancer-related subjects. Candidates should have strong research program and proven administrative talents. External funding helpful. Qualified persons should submit curriculum vitae and three references to: **Search Committee, Institute for Medical Research, 110 Hospital Drive, Bennington, Vt. 05201. An Equal Opportunity/Affirmative Action Employer.**

POSITIONS OPEN

TWO FACULTY OPENINGS

Tenure-track position for an assistant professor in vertebrate anatomy. Ph.D. required. Teaching duties involve anatomy and general biology. Starting date: September 1984.

Visiting assistant professor in animal physiology. Ph.D. desired. Position open January 1984 to June 1985. Teaching duties involve animal physiology and general biology.

Submit curriculum vitae, three letters of reference, statement of research interest and transcript by 8 November 1983 to:

Dr. B. R. Jones
Department of Biology
Southwestern at Memphis
Memphis, Tenn. 38112

Southwestern is an Equal Opportunity/Affirmative Action Employer.

GRADUATE TRAINING in Biochemistry and Biophysics at the University of Hawaii. Join our active medical school department engaged in numerous research projects of interest and importance. Unique geographical and cultural setting. Predoctoral teaching and research assistantships available September 1984 to qualified applicants. Write to: **Chairman, Department of Biochemistry and Biophysics, University of Hawaii, Honolulu, Hawaii 96822. An Equal Opportunity Employer.**

IMMUNOLOGY RESEARCH POSITION. Position available 1 July 1984 in postdoctoral series for Ph.D. to conduct basic and clinically oriented research related to the mucosal immune system, immunoregulation, oral vaccines and autoimmunity. Strong background in cellular immunology, immunogenetics, molecular biology or protein chemistry preferred. Please send résumé and names of three academic references to: **Dr. Martin Kagnoff, Department of Medicine, M-023-D, University of California, San Diego, La Jolla, Calif. 92093.**

IMMUNOPARASITOLOGIST THE UNIVERSITY OF NOTRE DAME

Assistant professor (tenure track) to conduct active research in immunoparasitology. Teaching (one course per semester) includes undergraduate and specialty courses. Appointment begins fall semester 1984. Postdoctoral experience is essential. The Biology Department includes 21 faculty and has strengths in parasitology, insect vector biology of diseases, aquatic biology, and biocomputing. Modern building. Submit curriculum vitae, transcripts, names of three referees, and statement of research and teaching interests to: **Dr. Theodore J. Crovella, Chairman, Department of Biology, University of Notre Dame, Notre Dame, Indiana 46556. Notre Dame is an Affirmative Action Employer. Qualified women and minority group candidates are urged to apply.**

MOLECULAR VIROLOGIST

A tenure-track position is open in the **DEPARTMENT OF MICROBIOLOGY, UNIVERSITY OF NOTRE DAME**, at the assistant professor level beginning 1 September 1984. We seek an outstanding individual to conduct an active research program in **VIROLOGY**, at the **MOLECULAR** level. Responsibilities include the direction of graduate students and the presentation of our advanced undergraduate and one graduate course in virology. Applicants should have postdoctoral experience and strong prospects for funding. We offer the successful candidate adequate seed money, a modern research laboratory (including germ-free animal facilities), a competitive salary, and colleagues with complementary research interests.

Submit curriculum vitae, a summary of research interests, and the names of three references by 15 January 1984 to:

Dr. Morton S. Fuchs
Department of Microbiology
University of Notre Dame
Notre Dame, Indiana 46556

This University is an Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL POSITION IN IMMUNOLOGY for research on cell surface molecules regulating lymphocyte interactions with endothelia that determine homing and entry into lymphoid tissues. Position available January 1984 at \$17,000 per annum. Send curriculum vitae and description of research experiences to: **Dr. Judith J. Woodruff, Department of Pathology, State University of New York, Downstate Medical Center, 450 Clarkson Avenue, Brooklyn, N.Y. 11203. An Affirmative Action/Equal Opportunity Employer.**

POSITIONS OPEN

POSITION IN INDUSTRIAL HYGIENE/ AIR POLLUTION

Applications are invited for a tenure-track position at the assistant professor level for fall 1984. A Ph.D. is required. The successful candidate will be expected to develop a research program with grant support and to teach at the graduate and undergraduate levels. Send résumé, letters of recommendation, and summary of research to: **Dr. V. Monsour, Search Committee, Biological and Environmental Sciences, McNeese State University, Lake Charles, La. 70609. Deadline 12 December 1983. McNeese is an Affirmative Action/Equal Opportunity Employer.**

MECHANICAL ENGINEER FLUID MECHANICS AND COMBUSTION

Northern California headquarters of a nationwide engineering and metallurgical consulting firm specializing in failure analysis and failure prevention is establishing a combustion laboratory and has an immediate need for an M.S.- or a Ph.D.-level mechanical engineer. Prior experience in fluid mechanics and combustion/consulting preferred. The scope of work may also include active participation in our corporate R&D program as well as product litigation, industrial consulting, and government contracts.

The position offers an outstanding benefits package and excellent salary commensurate with qualifications and experience. Please send confidential résumé and salary history to:

Failure Analysis Associates
2225 East Bayshore Road
Palo Alto, California 94303
Attention: Michele Gorman

MICROBIOLOGY/IMMUNOLOGY. Assistant professor position for fall 1984. Commitment to quality undergraduate teaching is essential. Teaching responsibilities: microbiology, immunology, and introductory biology. Candidate must also be willing to develop an undergraduate research program. Tenure-track position. Salary competitive. Send curriculum vitae, transcripts, statement of teaching and research interests, reprints, and three letters of reference by 1 December 1983 to: **Dr. George Jackson, Chair, Science and Mathematics Division, University of Tampa, Tampa, Fla. 33606. An Equal Opportunity/Affirmative Action Employer.**

MICROBIAL BIOCHEMISTRY POSTDOCTORAL POSITION available at University of California, San Francisco for studies in the general area of biological oxidations in prokaryotes. Current efforts focus on the structure of selected oxidoreductases, primarily by DNA sequencing, as part of a more complete analysis [*J. Mol. Biol.* 162, 869 (1982)] and on the biogenesis and transport of periplasmic oxidoreductases. Applicants should have a Ph.D. in biochemistry or microbiology with emphasis on microbial biochemistry. Previous experience in enzymology or DNA sequence analysis will be preferred. Please send curriculum vitae and names of three references to: **Dr. D. J. Steenkamp, Molecular Biology Division, Veterans' Administration Medical Center 1515, 4150 Clement Street, San Francisco, Calif. 94121.**

MICROBIAL GENETICS POSITION. A tenure-track microbial genetics position will be available 1 September 1984. An earned doctorate in area of microbiology and/or genetics is required. Responsibilities include teaching microbial genetics, microbiology, and introductory biology. Other teaching areas might include genetics, and/or molecular biology depending on the applicant's qualifications. The successful candidate will be expected to develop a strong research program in area of expertise. Undergraduate and graduate transcripts, three letters of recommendation, and reprints, along with other evidences of scholarly productivity, are required. Please submit curriculum vitae no later than 1 January 1984 to: **Dr. George W. Welker, Chairman, Department of Biology, Ball State University, Muncie, Ind. 47306. Ball State University practices Equal Opportunity in Education and Employment.**

POSTDOCTORAL POSITION AVAILABLE IMMEDIATELY to study the molecular mechanism of mutagenesis during DNA replication and repair. The annual salary is \$18,500. The project will utilize in vitro systems in which bacteriophage T7 DNA subjected to potentially mutagenic conditions can be replicated or repaired in vitro and the genetic consequences of these manipulations monitored by encapsulating the DNA into phage heads. Send curriculum vitae, statement of research interests and experience, and the names of two references to: **Dr. Warren Masker, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830.**

An Equal Opportunity/Affirmative Action Employer

The Gerontological Society of America proudly announces The 1983 Recipients of the

BROOKDALE AWARDS FOR DISTINGUISHED CONTRIBUTIONS TO GERONTOLOGY

The \$25,000 prizes go to

Vincent J. Cristofalo

Professor, Wistar Institute
Director, Center for the Aging
University of Pennsylvania

and

Robert H. Binstock

Stulberg Professor of Law and Politics
Director, The Policy Center on Aging
Florence Heller Graduate School
Brandeis University

for

BIOLOGICAL RESEARCH

**CONTRIBUTIONS
TO PUBLIC POLICY**

The awards will be conferred during the opening ceremonies of the GSA's
36th Annual Scientific Meeting on November 18, 1983 in San Francisco.

For information about making 1984 nominations contact: The Gerontological Society of America
1411 K Street, N.W., Suite 300
Washington, D.C. 20005
(202) 393-1411



RESEARCH PSYCHOLOGIST

The Office of Naval Research is seeking a highly qualified individual to plan and manage a contract research program in experimental psychology. The research sponsored is conducted principally at universities and industrial laboratories. This is a Civil Service position at the GM-13 (\$34,930—\$45,406) or GM-14 (\$41,277 — \$53,661) level, depending on individual qualifications.

The responsibilities of the incumbent will include formulating, implementing and monitoring a research program in cognitive psychology, human information processing, advanced computer-based instruction and psychological assessment, and in technology developments resulting from the contract research program. The incumbent will define new research opportunities, communicate ONR interest to the technical community, evaluate research proposals, manage available resources, and represent the program to Navy management.

Applicants must have a Ph.D. degree or equivalent in research psychology and at least 4 years of progressively responsible professional experience. At least one year of experience must be comparable in difficulty and responsibility to the next lower level in the Federal Service. Equivalent combinations of professional experience and graduate education may be acceptable.

Interested persons should submit a Standard Form 171, Personal Qualifications Statement (available at Federal Job Information Centers or from the address below), to:

**OFFICE OF NAVAL RESEARCH
Civilian Personnel Division, Code 791SC
ATTN: Announcement #83-40 (S)
800 North Quincy Street
Arlington, VA 22217**

Applications will be accepted through 10 November 1983 and must be received by that date. For further information and supplemental forms, please call (202) 696-4705.

An Equal Opportunity Employer

U.S. Citizenship Required

POSITIONS OPEN

MOLECULAR GENETICS UNIVERSITY OF TORONTO PREDOCTORAL AND POSTDOCTORAL FELLOWSHIPS

Positions available for training in molecular genetics. Areas of investigation include prokaryotic and eukaryotic regulation and genetic recombination, DNA bacteriophage assembly, mammalian somatic cell and molecular genetics, mammalian gene cloning, yeast genetics, molecular immunogenetics, and membrane molecular biology.

Toronto is a lively, cosmopolitan, safe, and clean city. Stipends: Predoctoral—\$9400; Postdoctoral—\$18,000. Send applications, including curriculum vitae and two reference letters to:

Chairman
Department of Medical Genetics
Medical Sciences Building
University of Toronto
Toronto, Ontario, Canada
M5S 1A8

NEUROBIOLOGY COLUMBIA UNIVERSITY

The Department of Biological Sciences, Columbia University in the City of New York, invites applications for a faculty position in the area of neurobiology. The level of appointment will depend upon qualifications of the successful applicant. The candidate is expected to have had postdoctoral research experience, to demonstrate a high level of scientific excellence and productivity and to have a strong commitment to undergraduate and graduate teaching. The three major programs within the Department of Biological Sciences are molecular biology and biochemistry, eukaryotic cell biology and virology, and neurobiology. Neurobiology faculty share a strong interest in problems of development and cell biology of the nervous system; the successful applicant is expected to share these interests. Applications should include a curriculum vitae, copies of most significant publications, and a summary of research goals. Junior applicants should also request that letters from three references be sent in support of their application. Send inquiries by 15 December to: **Dr. Darcy B. Kelley, Chair, Neurobiology Search Committee, Department of Biological Sciences, 600 Sherman Fairchild Center, Columbia University, New York, N.Y. 10027. Columbia University is an Equal Opportunity/Affirmative Action Employer. Women and members of minority groups are especially encouraged to apply.**

PHARMACOLOGIST

The Fox Chase Cancer Center is recruiting an experienced, independent investigator to organize and direct a clinical cancer pharmacology program. The candidate must have a Ph.D. or M.D. degree and a proven record of obtaining research funds. Salary and level of appointment commensurate with training and experience. Send curriculum vitae and names of three references to: **Paul F. Engstrom, M.D., Fox Chase Cancer Center, 7701 Burholme Avenue, Philadelphia, Pa. 19111. Closing date for applications: 31 October 1983. Equal Opportunity/Affirmative Action Employer.**

POPULATION/COMMUNITY ECOLOGIST

Tenure-track assistant professor position for population/community ecologist with demonstrated excellence in experimental field (or field and laboratory) research. Candidates should be competent in mathematical aspects of ecology; contribute to courses in general ecology, modeling, and theoretical ecology; and participate in the graduate program in ecology and evolutionary biology. Candidates must have a Ph.D., potential for excellence in teaching, ability to develop an independently funded research program, and potential to integrate productively with faculty in ecology and evolutionary biology. Applicants should submit a résumé, including research and teaching experience, future research plans, and a list of publications, and have three letters of reference sent by 1 January 1984, to: **Dr. D. H. Morse, Division of Biology and Medicine, Brown University, Providence, Rhode Island 02912. An Equal Opportunity/Affirmative Action Employer.**

POSTDOCTORAL POSITION now available to study RNA processing in animal cells and viruses. Background either in biochemistry, microbiology, or molecular biology needed. Salary negotiable. Please send résumé with two names for references to: **Dr. Mary Edmonds, Department of Biological Sciences, University of Pittsburgh, Pittsburgh, Pa. 15260. Equal Opportunity/Affirmative Action Employer.**

POSITIONS OPEN

YALE UNIVERSITY SCHOOL OF MEDICINE POSTDOCTORAL TRAINEE

Position available immediately to investigate the hormonal regulation of melanoma growth and pigmentation. Research employs a variety of genetic and biochemical techniques with cultured melanoma cells. Emphasis placed on structure and function of receptors for MSH in mutant and wild-type cell lines.

Position is for 1 to 4 years, funded by NIH. Send curriculum vitae and three letters of reference to: **Dr. John Pawelek, Department of Dermatology, Yale University School of Medicine, New Haven, Connecticut 06510. An Equal Opportunity/Affirmative Action Employer.**

POSTDOCTORAL POSITION available for the experimental study of the entrainment, deposition, and transport of sediments in lakes and oceans. The research will be primarily in the laboratory but will also involve some fieldwork. Competence in experimental fluid mechanics and interest in environmental problems is necessary. The position will remain open until filled. Applicants should send résumé and names of three references to:

Professor Wilbert Lick
Department of Mechanical and
Environmental Engineering
University of California
Santa Barbara, Calif. 93106

An Equal Opportunity/Affirmative Action Employer

POSTDOCTORAL FELLOW to study in vivo and in vitro cellular immune responses utilizing available monoclonal antibodies and both cytotoxic and helper T cell clones specific for a virus used as a murine model for multiple sclerosis. Candidate should have a relevant Ph.D. Send curriculum vitae to: **Stephen A. Stohman, Ph.D., Department of Neurology and Microbiology, MCH 142, University of Southern California, School of Medicine, 2025 Zonal Avenue, Los Angeles, Calif. 90033. Equal Opportunity Employer, M/F/H.**

POSTDOCTORAL POSITION for recent Ph.D. or M.D., U.S. citizen or permanent resident, available immediately, supported by NIH training grant (National Research Service Awards), in the area of basic cancer chemotherapy, clinical cancer chemotherapy, cancer biology (including radiation biology), or cancer drug development (organic synthesis). Application deadline is 1 month. Send résumé indicating area(s) of interest and two or more letters of reference to: **Dr. Sungman Cha, Brown University, Box G, Providence, R.I. 02912. Telephone (401) 863-3114. An Equal Opportunity/Affirmative Action Employer.**

POSTDOCTORAL POSITION available immediately for biochemist/neuroscientist to study GABA-gated chloride channel complexes in cultured cerebral neurons. Background in membrane protein isolation, ion transport, or tissue culture preferred. Appointment as research associate in biochemistry is renewable for additional years. Send curriculum vitae and names of three references to: **Dr. Eugene M. Barnes, Jr., Department of Biochemistry, Baylor College of Medicine, Houston, Texas 77030. An Affirmative Action/Equal Opportunity Employer.**

POSTDOCTORAL POSITION. Available November 1983 to study the biological effect of calcium containing crystals on cultured mammalian cells. Applicants should have a doctoral degree in biochemistry, cell biology, or a related field. Experience in membrane transport and intracellular calcium measurement is desirable. This position is supported by an NIH grant for up to 3 years. Starting stipend ranges from \$17,000 to \$19,000. Please send curriculum vitae and three letters of reference to: **Dr. Herman Cheung, Department of Medicine, Medical College of Wisconsin, 8700 West Wisconsin Avenue, Milwaukee, Wisc. 53226. Telephone: 414/257-5142.**

POSTDOCTORAL POSITION available immediately to study molecular population genetics of bacteria. Background in microbiology, biochemistry, or population genetics required. Send curriculum vitae and three letters of recommendation to: **Dr. Robert K. Selander, Department of Biology, University of Rochester, Rochester, N.Y. 14627.**

POSTDOCTORAL POSITION. Available on NIH training grant to study regulation by insulin of protein phosphorylation and dephosphorylation reactions in variant cell lines and somatic cell hybrids. Send résumé and names of references to: **Daniel S. Straus, Biomedical Sciences Division, University of California, Riverside, Calif. 92521. An Affirmative Action/Equal Opportunity Employer.**

POSITIONS OPEN

POSTDOCTORAL FELLOW

Ph.D. or M.D. interested in studying membrane, electrical and mechanical events of vascular muscle cells in cerebral arteries with special reference to cerebral vasospasm and mechanisms of action of neurotransmitters. Experience in measuring transmembranes electrical events from smooth, cardiac or skeletal muscle necessary. Work will focus on studying small resistance and microcirculatory vessels. Background in muscle mechanics would be helpful but not necessary. If interested call 414-259-2885 or send résumé to: **Dr. David R. Harder, Associate Professor, Departments of Neurology and Physiology, MEDICAL COLLEGE OF WISCONSIN, 9200 West Wisconsin Avenue, Milwaukee, Wisc. 53226. Equal Opportunity Employer.**

POSTDOCTORAL POSITIONS. The Department of Microbiology of the College of Medicine of the Pennsylvania State University has available postdoctoral positions in viral oncology. The areas of training include virus transfection; molecular, cellular, and cancer biology; virus genetics; studies on metastases; and viral immunology. State of the art techniques, such as recombinant DNA technology and production and use of monoclonal antibodies, are stressed. Financial support is available through a 5-year renewal of an NIH training grant and other sources. Qualified applicants are invited to send their curriculum vitae and the names of three references to: **Dr. Fred Rapp, Department of Microbiology, the Pennsylvania State University College of Medicine, Post Office Box 850, Hershey, Pa. 17033. An Equal Opportunity Employer.**

POSTDOCTORAL POSITION— NEUROBIOLOGIST

To investigate interactions between microwaves and the developing brain. Background in developmental neurobiology, autoradiography, light and electron microscopy desirable. Considerable interface with CNS regeneration group is also anticipated. Position available for 2 to 3 years. Please send curriculum vitae and names of three references to: **Dr. Ernest Albert, Department of Anatomy, The George Washington University Medical Center, 2300 I Street, NW, Washington, D.C. 20037.**

The Basic Science Departments (Anatomy, Biochemistry, Microbiology, Pathology, Pharmacology, Physiology), Medical School, University of Minnesota, periodically have openings for **POSTDOCTORAL TRAINING.**

For information about possible openings in these programs, write, specifying department of interest, to:

University of Minnesota Medical School
Box 293 Mayo Building
420 Delaware Street SE
Minneapolis, Minnesota 55455
Attention: James C. Nelson

The University of Minnesota is an Equal Opportunity Educator and Employer and specifically invites and encourages applications from women and minorities.

STEROID CHEMIST. Postdoctoral scientist with Ph.D. in organic chemistry is sought to work under the supervision of Dr. P. N. Rao, Director of Organic Chemistry, for the synthesis of novel steroid haptens and other derivatives required for immunoassay development and cell transformation studies. Work also involves antisera product and ultimate development of enzyme immunoassays. Annual salary range is \$17,784 to \$20,529, dependent upon experience. One-year initial appointment with possibility of second year. Successful candidate with novel ideas in other aspects of steroid research will be encouraged to seek independent research support with opportunity for regular staff appointment. Please respond to: **Personnel Manager, Southwest Foundation for Research and Education, Post Office Box 28147, San Antonio, Texas 78284. Include curriculum vitae, description of research interests, and names of three references, including major professor. An Equal Opportunity/Affirmative Action Employer.**

Immediate opening for Ph.D. **TOXICOLOGIST** to work for rapidly developing, exciting company; experience in the areas of predictive toxicology and risk assessment highly desirable. Salary negotiable; send curriculum vitae and letter of interest to: **ENVIROLOGIC DATA, Department TX, Post Office Box 1438, Portland, Maine 04104.**

**CHIEF,
IMMUNOBIOLOGY AND IMMUNOCHEMISTRY BRANCH
IMMUNOLOGY, ALLERGIC AND IMMUNOLOGIC
DISEASES PROGRAM**

Salary range:

\$48,553-\$63,115 — General Schedule Pay Scale.

\$51,353-\$65,357 — Medical Officer Pay Scale.

In addition, applicant may be eligible for Physicians

Comparability Allowance up to \$10,000.

Description:

This position is concerned with NIAID Extramural Activities of the Immunology, Allergic and Immunologic Diseases Program. The Chief of the Immunobiology and Immunochemistry Branch plans and conducts the NIAID's research grants, training grants, fellowships, career awards and research resources programs in the area of basic immunology. He/she is responsible for coordinating the various support programs, develops priorities within the scientific program area of immunobiology and immunochemistry, and develops and maintains liaison with appropriate departments of universities, other institutions, other components of the NIH and DHHS, advisory bodies and other relevant scientific organizations.

Qualifications and requirements for the position:

Applicant must possess a doctorate degree in medical science (M.D.) or degree in the biological sciences (Ph.D., D.V.M., D.D.S., D.O.) with substantial experience in research and administrative capabilities or equivalent experience; must also have extensive and current background knowledge in immunology.

Person to be contacted for further information:

Sheldon G. Cohen, M.D. (301-496-1884), Director
Immunology, Allergic and Immunologic Diseases Program

Applications should be sent to:

NIAID Personnel Office, Attention: Jane Schriver
9000 Rockville Pike, Building 31, Room 7A31, Bethesda, MD 20205

**National Institutes of Health
National Institute of Allergy and Infectious Diseases**

NIH is an Equal Opportunity Employer.

**NATIONAL CANCER INSTITUTE
DIVISION OF CANCER TREATMENT
RADIATION RESEARCH PROGRAM**

**Associate Director,
Radiation Research Program**

Salary Range — \$56,945 to \$63,800

(Physicians may be eligible for a Physicians' Comparability Allowance up to \$10,000 per year)

Has overall responsibility for the planning, evaluation and coordination of broad national and international radiation research programs designed to determine effectiveness of radiation in cancer treatment, usefulness in diagnosis of cancer and other diseases, and biological effects of exposures to low doses of ionizing and non-ionizing radiations. Administers a \$60 million contract and grant program.

Position information and qualifications requirements may be obtained by contacting:

**Cynthia A. Kauff, PMS
National Cancer Institute,
Building 31 Room 3A23
Bethesda, Maryland 20205, 301-496-6864**

Applications (SF-171, CV and Bibliography) must be submitted to above address and postmarked not later than November 15, 1983.

AN EQUAL OPPORTUNITY EMPLOYER

**POSTDOCTORAL RESEARCH
APPOINTMENTS IN
CELLULAR & MOLECULAR BIOLOGY
LOS ALAMOS NATIONAL LABORATORY**

The Genetics Group of the Life Sciences Division is accepting applications for postdoctoral fellowships in cellular and molecular biology.

Postdoctoral fellows may participate in a wide selection of programs including, but not limited to, studies in radiation and chemically induced neoplastic transformation and mutagenesis, somatic cell genetics, gene expression, and DNA repair. Candidates should have training in recombinant DNA technology, cell culture, and nucleic acid metabolism and wish to apply these techniques in molecular genetics. Fully equipped laboratory facilities, computer facilities and technical library resources provide excellent research conditions. The Laboratory is operated by the University of California for the Department of Energy. Our location in the mountains of northern New Mexico offers a beautiful environment with exceptional recreational activities.

Postdoctoral appointments are for one year, renewable for a second year and pay a stipend amount of \$26,220 to \$27,600 per annum (depending on research experience). We provide a full range of employee benefits, including incoming travel and moving expenses. Candidates no more than three years past their Ph.D. are invited to apply.

For additional information, call Ronald Walters at (505) 667-2695. To apply, send resume, undergraduate and graduate transcripts, and three letters of reference, in confidence to:

Madeline Lucas Los Alamos National Laboratory
Personnel Services, DIV 83-BE Los Alamos, NM 87545

University of California

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

An Affirmative Action/Equal Opportunity Employer: Women, Minorities, Handicapped and Veterans are urged to apply.

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☐ Payment enclosed

☐ Bill me later

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Please print

Address

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State

Zip

SM10

**ATTACH
LABEL
HERE**

POSTDOCTORAL FELLOWSHIP in protein chemistry available immediately. Research involves peptide synthesis and immunochemistry of proteins. Send curriculum vitae and three letters of recommendation to:

John A. Smith, M.D., Ph.D.
Department of Molecular Biology
Massachusetts General Hospital
Boston, Mass. 02114
617-726-5954

POSTDOCTORAL RESEARCH ASSOCIATE

Postdoctoral traineeship available for research in yeast molecular genetics in the Donner Laboratory, Biology and Medicine Division, Lawrence Berkeley Laboratory, University of California. The research program involves the molecular cloning of yeast REC genes, studies of their role in MITOTIC and MEIOTIC recombination employing both in vivo and in vitro test systems, and electron microscopic visualization of DNA recombinational intermediates. Requires recent Ph.D. in molecular biology, biochemistry, genetics, or related field and previous research experience and training in molecular genetics. Two-year term appointment renewable to a maximum of 3 years. Salary range \$1575 to \$1840 per month. Send curriculum vitae and names and addresses of three references to: Dr. Michael Esposito, c/o Mr. Ronald Lowder, Personnel Department/Building 65, Lawrence Berkeley Laboratory, One Cyclotron Road, Berkeley, Calif. 94720. An Affirmative Action/Equal Opportunity Employer M/F/H.

PLANT PHYSIOLOGIST/CYTOLOGIST. Tenure-track appointment starting 23 January 1984. Teaching responsibilities plant physiology, plant cytology, plant morphology, and lower-level biology courses. Ph.D. preferred. Salary and rank commensurate with experience. Application deadline: 15 November 1983. Send curriculum vitae and names of three references to: Dr. Raymond Milewski, Department of Biology, East Stroudsburg University, East Stroudsburg, Pa. 18301. An Affirmative Action/Equal Opportunity Employer.

POSTDOCTORAL RESEARCH FELLOW—Research fellowship is available to investigate the metabolic response to stress, with focus on the nutritional implications. Emphasis is on in vivo tracer techniques using both radioactive and stable isotopes. M.D. or Ph.D. required, with emphasis in physiology, biochemistry or nutrition. Contact:

Dr. Robert R. Wolfe
Chief, Metabolism Unit
Shriners Burns Institute
University of Texas Medical Branch
610 Texas Avenue
Galveston, Texas 77550

POSTDOCTORAL FELLOW. Immediately available. The Dairy Research Foundation is supporting research on the sensory aspects of real dairy foods. Candidates must have a Ph.D. in dairy/food science or related field with a background in organic chemistry, biochemistry or physiology as well as a personal commitment to the advancement of real dairy products. Multidisciplinary research facilities are available. Send curriculum vitae with names and addresses of three references before 1 December 1983 to: Director, Monell Chemical Senses Center, 3500 Market Street, Philadelphia, Pa. 19104.

POSTDOCTORAL ASSOCIATE

Available immediately; screening will begin immediately. Position will collaborate on an NIA/NIH grant studying age-related changes in oral mucosa and skin. Requires Ph.D. and a background in biochemical metabolism with experience in the use of radioactive isotopes, determination of rates of protein synthesis, extraction and identification of lipids using thin-layer chromatography and assay to determine binding affinity. Experience in tissue culture helpful but not necessary. Salary will be consistent with NIH postdoctoral salary scale. Send curriculum vitae, official transcripts, and names of two referees to: Dr. Murray Hill, Dows Institute for Dental Research, College of Dentistry, University of Iowa, Iowa City, Iowa 52242. The University of Iowa is an Affirmative Action/Equal Opportunity Employer.

POSTDOCTORAL POSITION. Available 1 March 1984 for research in the neural control of thermoregulation, circadian rhythms and sleep. Techniques include computerized data acquisition and analysis of daily drinking, activity and temperature rhythms, EEG recording, time lapse video recording and standard stereotaxic and histological procedures. Salary: \$14,000 to \$16,000. Send curriculum vitae and three letters of recommendation by 31 January 1984 to: Dr. Evelyn Satinoff, Department of Psychology, 603 East Daniels, University of Illinois, Champaign, Ill. 61820 (217-333-1615). Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL POSITION available immediately for studies on enzymology intermediary and membrane function. Send curriculum vitae and two letters of recommendation to: Dr. T. C. Welbourne, Department of Physiology and Biophysics, Louisiana State University Medical School, Post Office Box 33932, Shreveport, La. 71130.

An Equal Opportunity Employer

POSTDOCTORAL POSITION, 1983. Involves basic and clinical research in human cancer cell differentiation and growth, primarily in leukemia, the lymphokines as regulators and the relationship to human immunobiology of lymphocyte subclasses. The biochemical and biological characteristics of the regulators are pursued. Approaches include methodologies from cell biology, monoclonal antibodies, and cell cycle analysis etc. Applicants should have a Ph.D., M.D., or the equivalent. Research is done in a new career research unit. Interested applicants should send résumé to: Dr. J. W. Chiao, Department of Medicine, New York Medical College, Valhalla, N.Y. 10595. An Equal Opportunity Employer.

PRE- AND POSTDOCTORAL OPPORTUNITIES IN HUMAN CANCER BIOLOGY UNIVERSITY OF WISCONSIN

The Department of Human Oncology has openings for graduate and postdoctoral study. Predoctoral students will enroll in the new graduate program leading to M.S. and Ph.D. degrees in human cancer biology. The program is designed to educate students for teaching and research careers in the laboratory sciences immediately related to the etiology, diagnosis, treatment, and prevention of human cancer. Research areas include pharmacology and experimental therapeutics, cell biology, radiobiology, immunology, and carcinogenesis as applied to human cancer. For more information, contact:

Human Cancer Biology Program
K4/310 Clinical Sciences Center
University of Wisconsin
Madison, Wisconsin 53792

POSTDOCTORAL POSITION available immediately in clinical biochemistry. Candidates should possess a Ph.D. in biochemistry or allied sciences and be interested in a career in clinical chemistry. This 2-year program provides comprehensive experience in all major areas of clinical chemistry as well as involvement in related basic and clinical research. Position available to U.S. citizens and permanent residents. Applicants should send curriculum vitae and names of three references to: Director of Education, The Cleveland Clinic Educational Foundation, 9500 Euclid Avenue, Cleveland, Ohio 44106 or call 1-800-321-7000 or 1-800-362-1001 in Ohio.

RESEARCHER: Job order number 416730. Plans and executes special test programs at Louisiana sugar factories; concerned with technical performance of bagasse combustion furnaces; measures furnace efficiency; designs, installs, and tests furnace control systems, including use of automation and microprocessors. Consults with sugar industry personnel on furnace/boiler performance and energy conservation; makes recommendations for improvement. Performs independent research in processing of sugarcane and combustion of bagasse; initiates, plans, executes, and reports on research. Serves as principal investigator on research contracts. Provides extension services to sugarcane industry. Special knowledge is required of bagasse furnaces of all types: steam boilers, automatic process control equipment, and microprocessors. Ph.D. in science field. Four years of experience in combustion energy conservation; 40 hours per week, \$31,800 per year. Contact: Louisiana Department of Labor, 1991 Wooddale Boulevard, Baton Rouge, La. 70806.

RADIOBIOLOGIST. We seek a highly qualified individual to head the radiobiology laboratory of the Johns Hopkins Oncology Center. Applicants should have a doctorate and relevant postdoctoral experience. Further, they should show evidence of scientific productivity and academic leadership qualities. Special research opportunities exist in the areas of drug-radiation interactions and low dose rate effects (radioimmunoglobulin therapy). The successful applicant will be expected to develop an independent research program complementary to investigations in molecular and cell biology and therapeutic research ongoing in the Center as well as contribute to the teaching of undergraduate and graduate students and residents. Applications, including a complete curriculum vitae and names of at least three references, should be forwarded to: Dr. Stanley E. Order, Chairman, Search Committee, Johns Hopkins Oncology Center, 600 North Wolfe Street, Baltimore, Maryland 21205.

Affirmative Action/Equal Opportunity Employer

RESEARCH SCIENTIST to conduct research on the biosynthesis of pteridine derivatives in *Drosophila melanogaster*. Work includes purification and study of enzymes involved in the pathway, identification of enzymatic products, and biochemical and genetic analysis of mutants.

Requires Ph.D. in biology or related field and experience in protein purification and techniques associated with *Drosophila* research, including genetics. Must be able to contribute significantly to the design, execution and interpretation of research projects. Salary range: \$21,000 to \$25,000.

Please submit two copies of résumé to: Ms. Vera J. Ballard, Massachusetts Institute of Technology Personnel Office, E19-239, 77 Massachusetts Avenue, Cambridge, Mass. 02139. Refer to Job Number R1160. MIT is an Equal Opportunity/Affirmative Action Employer.

PULMONARY PHYSICIAN

We are seeking an academic pulmonary physician with established research ability in cellular physiology. Clinical responsibility will be to share in teaching and administration of pulmonary function laboratory. Excellent salary and fringe benefits. Please send curriculum vitae to: Harry Steinberg, M.D., Chief, Pulmonary Medicine, LONG ISLAND JEWISH-HILLSIDE MEDICAL CENTER, New Hyde Park, N.Y. 11042. An Equal Opportunity Employer.

Two positions open to Ph.D. **PROTEIN CHEMISTS** interested in the involvement of platelet proteins in thrombosis. Knowledge of immunochemistry desirable. Please send résumé and reference letters to: Dr. J. Bryan Smith, Thrombosis Research Center, Temple University Health Sciences Center, 3400 North Broad Street, Philadelphia, Pa. 19140. Equal Opportunity/Affirmative Action Employer.

RESEARCH SCIENTISTS IN PROTEIN CHEMISTRY AND ORGANIC CHEMISTRY

The Dana-Farber Cancer Institute, affiliated with Harvard Medical School, announces openings for research scientists experienced in organic chemistry and protein chemistry, including protein purification and covalent derivatization. Applicants should have postdoctoral experience in protein chemistry and biochemistry. Appointees will join a team involved in research and development of immunotoxins as reagents for treatment of human cancers. Appointments will be on the research ladder at a level equivalent to an instructor. Applicants should arrange for curriculum vitae and three letters of recommendation to be sent to: Dr. W. Blattler, Dana-Farber Cancer Institute, 44 Binney Street, Boston, Mass. 02115. An Affirmative Action/Equal Opportunity Employer.

RESEARCH SPECIALIST. The Fox Chase Cancer Center will be directing a new research project funded by the National Cancer Institute: "Cancer Education Management." An immediate opening exists for an individual to assume the responsibility for the successful implementation, administration and subsequent evaluation of this program. Duties include protocol design, development and testing of multimedia patient education materials, data analysis, evaluation of research, and direct patient education and interviewing. Qualified candidates should possess a master's degree in health education/oncology, nursing, or a related field. RN preferred. Minimum of 3 years clinical experience and demonstrated statistical/analytical skills required. Excellent salary and benefits package. Send curriculum vitae to: Mary Harold, Personnel Department, Fox Chase Cancer Center, 7701 Burholme Avenue, Philadelphia, Pa. 19111. An Equal Opportunity/Affirmative Action Employer.

TISSUE CULTURE SCIENTIST

Weyerhaeuser Company is seeking a scientist experienced in woody plant tissue culture for its programs on the micropropagation of coniferous trees and woody ornamental plants. Candidates should have a Ph.D. and an ability to work independently but cooperatively within a small, high-caliber research team. A strong background in plant morphogenesis, developmental biology, biochemistry, or cell physiology is preferred.

The Weyerhaeuser Technology Center is located in a lake and forest setting near Tacoma, Washington. It houses people, facilities, and supporting services of unparalleled quality. Salaries and other benefits are highly competitive. Send curriculum vitae including publication list and names of three professional references before 11 November 1983 to: Tom Fritschler, Technical Recruiting Manager, WTC 1G42, Weyerhaeuser Technology Center, Tacoma, Wash. 98477.

The MX Missile and the Strategic Balance of Power

A collection of recent articles from SCIENCE on contemporary strategic ideology is now available for use by professionals, teachers, and researchers interested in the nuclear arms race.

"Anyone seeking a better understanding of the MX debate would do well to look at [this] series of brief, clearly written analyses."

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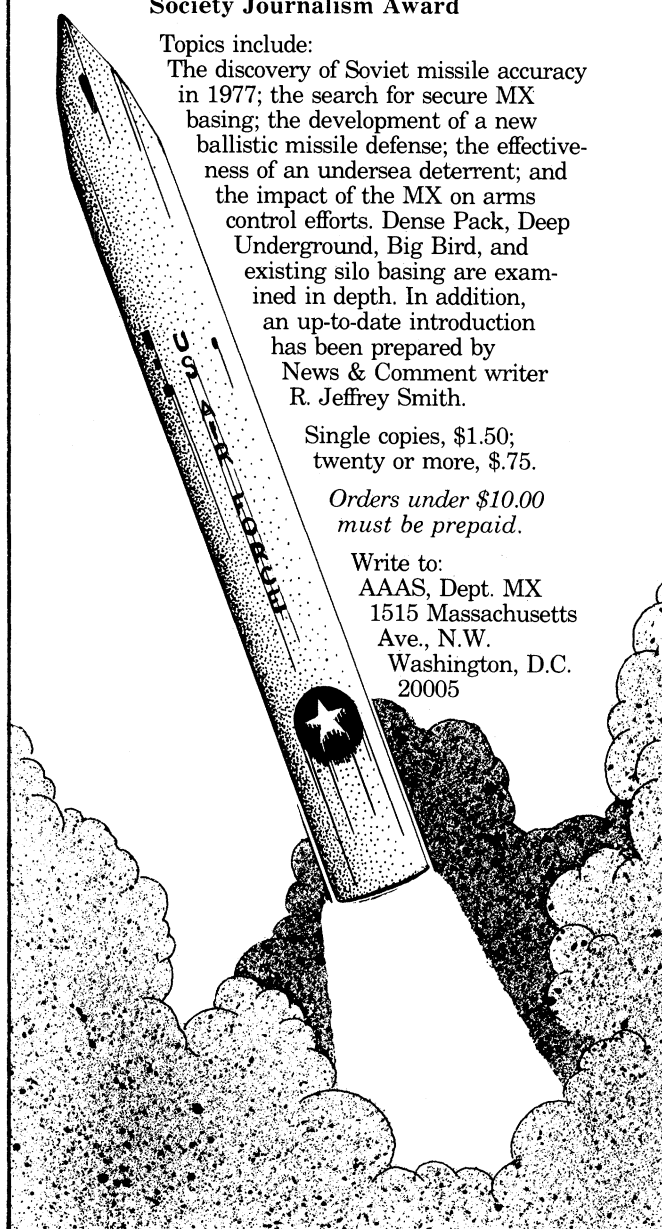
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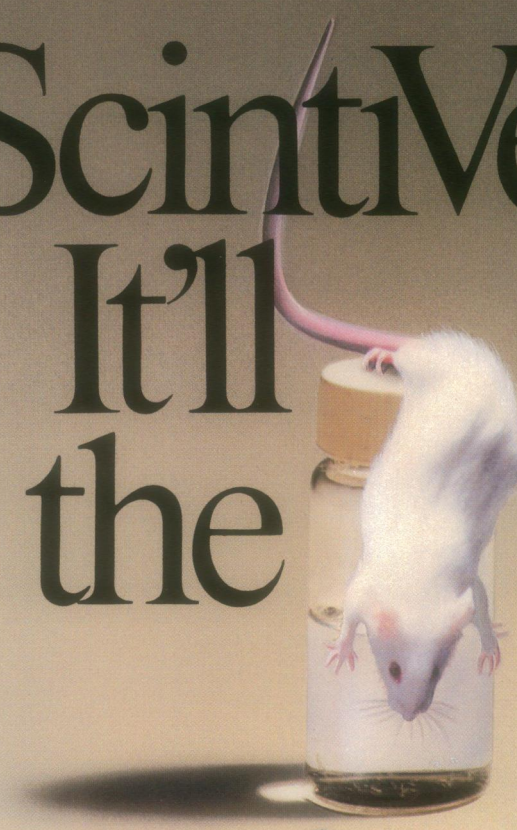
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