

Curriculum Vitae

Sidney M. Hecht

Born: July 27, 1944, New York City
Home Address: 6517 North 26th Street
Phoenix, AZ 85016

Education

1966 B.A., Chemistry; University of Rochester
1970 Ph.D., Chemistry (minor: Biochemistry), University of Illinois

Employment

University of Wisconsin

1970 National Institutes of Health Postdoctoral Fellow

Massachusetts Institute of Technology

1971-75 Assistant Professor of Chemistry
1975-79 Associate Professor of Chemistry

University of Virginia

1978-2008 John W. Mallet Professor of Chemistry; Professor of Biology
2008- Professor Emeritus

Smith Kline & French Laboratories

1981-83 Vice President, Preclinical Research & Development
1983-86 Vice President, Chemical Research & Development
1986-87 SK&F Distinguished Fellow

Arizona State University

2008- Professor of Chemistry & Director, Center for BioEnergetics, Biodesign Institute

Awards, Honors

1967-70 National Institutes of Health Predoctoral Fellow
1970-71 National Institutes of Health Postdoctoral Fellow
1975-79 Alfred P. Sloan Research Fellow
1975-80 National Institutes of Health Research Career Development Awardee
1977-78 John Simon Guggenheim Memorial Fellow
1996 Arthur C. Cope Scholar Award
1996 Virginia's Outstanding Scientist
1998 Research Achievement Award, American Society of Pharmacognosy
2004 Fellow, American Association for the Advancement of Science
2007 Fellow, American Society of Pharmacognosy
2009- Annual Hecht Lectureship established at University of Virginia
2011 ASU Faculty Achievement Award in Defining Edge Research: Innovation
2018 Member, National Academy of Inventors
2019 Senior Member, National Academy of Inventors
2020 Fellow, National Academy of Inventors

Other Academic Appointments, Lectureships

- 1978 Visiting Professor, Max-Planck Institut für experimentelle Medizin, Göttingen
1979-81 Center for Advanced Studies, University of Virginia
1984 T.Y. Shen Visiting Professor, Massachusetts Institute of Technology
1985 Percy Julian Lectureship, Howard University
1991 Professeur Associé, Muséum National D'Histoire Naturelle, Paris
1991 Gastprofessor, Eidgenössische Technische Hochschule, Zurich
1991 H.C. Brown Lectureship, Purdue University
1992 Ralph Hirschmann Lectureship, Oberlin College
1993 Webster-Sibilsky Lectureship, University of Illinois at Chicago
1994 Distinguished Biochemistry Lectureship, University of Toledo
1997 Eli Lilly Lectureship, Colorado State University
1997 Nelson J. Leonard Distinguished Lectureship, University of Illinois
1997 Servier Lectureship, Université de Montréal
1999 Frontiers in Organic Chemistry Lectureship, Brigham Young University
2000 W. Allan Powell Lectureship, University of Richmond/American Chemical Society, Virginia Section
2000 Professeur Associé, Muséum National D'Histoire Naturelle, Paris
2001 UCLA/Isis Lectureship
2002 Western Switzerland Universities Lectureship
2003 Boehringer-Ingelheim Lecturer, Université du Québec à Montréal
2003 Arnold D. Welch Distinguished Lecturer in Pharmacology, St. Jude Children's Research Hospital
2004 Frontiers in Biological Chemistry Lecturer, Kyoto University
2004 Pfizer Lecturer in Organic Chemistry, Indiana University
2006 Abbott Laboratories Lecturer, Iowa State University
2006 Dow/Karabatsos Distinguished Lectureship, Michigan State University
2007 Groupe de Recherche Universitaire sur le Médicament (GRUM) Lectureship, Université de Montréal
2009 Sidney M. Hecht Lecturer, University of Virginia
2014 University Molecular Life Sciences Seminar Series Lecturer, Ohio State University
2016 Ionis Pharmaceuticals Lecturer, University of California, Irvine

Professional Societies

The Chemical Society
American Chemical Society
American Society for Biochemistry and Molecular Biology
American Association for the Advancement of Science
American Society of Pharmacognosy

Invited Lectures

- 1983 *Northwestern University* (Chemistry Department): Invited Lecturer
University of Virginia (Biology Department): Invited Lecturer
University of Virginia (Microbiology Department): Invited Lecturer
University of Rochester (Chemistry Department): Invited Lecturer
University of Rochester (Medical School): Invited Lecturer
Gordon Research Conference on Carbohydrates: Invited Lecturer
National Cancer Institute Symposium on the Discovery and Development of Naturally Occurring Antitumor Agents, Frederick, MD: Invited Lecturer

National Cancer Institute Workshop on Biological Modulators, Gaithersburg, MD: Invited Lecturer
University of Illinois (Chemistry Department): Invited Lecturer
University of Illinois (Biochemistry Department): Invited Lecturer
Beckman Instruments (Peptide Chemistry Department): Invited Lecturer
University of California, Los Angeles (Chemistry Department): Invited Lecturer
California Institute of Technology (Division of Chemistry and Chemical Engineering): Invited Lecturer
University of California, Davis (Chemistry Department): Invited Lecturer
Baylor College of Medicine: Invited Lecturer

1984 *Centennial Symposium, School of Pharmacy, Purdue University*: Invited Lecturer
University of California, San Francisco (VA Hospital): Invited Lecturer
Villanova University (Chemistry Department): Invited Lecturer
American Chemical Society, Joint Great Lakes/Central Regional Meeting, Kalamazoo: Invited Lecturer
Gordon Research Conference on Natural Products: Invited Lecturer
Annual Meeting, Plant Growth Regulator Society, Boston: Invited Lecturer
25th Annual Meeting, American Society of Pharmacognosy, Austin: Invited Lecturer
188th National American Chemical Society Meeting, Philadelphia: Invited Lecturer
Pacific Conference on Chemistry and Spectroscopy, Sacramento: Invited Lecturer
Symposium on Bioorganic Chemistry, U. of Maryland: Invited Lecturer
Massachusetts Institute of Technology (Chemistry Department): T.Y. Shen
Visiting Professor
International Chemical Congress of Pacific Basin Societies, Honolulu: Invited Lecturer

1985 *University of Mississippi* (Pharmacognosy Department): Invited Lecturer
Gordon Research Conference on Oxygen Radicals in Medicine and Biology: Invited Lecturer
Howard University (Chemistry Department, Sigma Xi): Percy Julian Lectureship
University of Utah (Medicinal Chemistry Department): Invited Lecturer
American Chemical Society, 15th Northwestern Regional Meeting, SUNY New Paltz: Invited Lecturer
International Research Conference on Natural Products, Chapel Hill: Plenary Lecturer
Gordon Research Conference on Enzymes, Coenzymes and Metabolic Pathways: Invited Lecturer
Santa Fe Graduate Medicinal Chemistry Conference: Keynote Speaker
American Society for Pharmacology and Experimental Therapeutics/American Chemical Society Joint Meeting, Boston: Invited Lecturer
University of Washington (Chemistry Department): Invited Lecturer

1986 *State University Leiden* (Chemistry Department): Invited Lecturer
Université Catholique de Louvain (Chemistry Department): Invited Lecturer
American Chemical Society, 191st National Meeting: Invited Lecturer
University of Illinois (Chemistry Department): Invited Lecturer
University of Wisconsin (Chemistry Department): American Chemical Society Lectureship
Harvard University (Chemistry Department): Invited Lecturer
American Society of Biological Chemistry/American Chemical Society Joint Meeting, Washington, DC: Invited Lecturer

Stanford University (Chemistry Department): Invited Lecturer
Cornell University (Chemistry Department): Invited Lecturer

1987 *Second International Conference on Anticarcinogenesis and Radiation Protection*, Gaithersburg, MD: Invited Lecturer
Museum National d'Histoire Naturelle: Invited Lecturer
Institut de Chimie des Substances Naturelles: Invited Lecturer
University of Massachusetts, Amherst (Polymer Science and Engineering Department): Invited Lecturer
Hoffmann-La Roche, Nutley: Invited Lecturer
American Chemical Society, 42nd Northwest Regional Meeting, Washington: Invited Lecturer
Yale University (Chemistry Department): Invited Lecturer
International Conference on Perspectives in Molecular Approaches to Human Diseases, Bari: Invited Lecturer
Rensselaer Polytechnic Institute (Chemistry Department): Invited Lecturer
Centre National de la Recherche Scientifique, Toulouse (Laboratoire de Chimie de Coordination): Invited Lecturer
State University Leiden (Chemistry Department): Invited Lecturer
Eidgenössische Technische Hochschule, Zurich (Chemistry Department): Invited Lecturer
Eidgenössische Technische Hochschule, Zurich (Biochemistry Department, Invited Lecturer

1988 *University of Nebraska* (Eppley Institute): Invited Lecturer
University of Missouri (Chemistry Department): Invited Lecturer
American Chemical Society, Brazosport Section: Invited Lecturer
University of California, Davis (Chemistry Department): Invited Lecturer
Johns Hopkins University (Biophysics Division): Invited Lecturer
16th International IUPAC Symposium on the Chemistry of Natural Products, Kyoto: Invited Lecturer
IUPAC Nagoya Symposium on New Topics in Natural Products, Toba: Plenary Lecturer
Osaka University (Institute for Scientific and Industrial Research): Invited Lecturer
Kyoto University Synthetic Chemistry Department: Invited Lecturer
Nagoya University (Molecular Biology Department): Invited Lecturer
Showa University (Synthetic Chemistry Department): Invited Lecturer
Tokyo Institute of Technology (Chemistry Department): Invited Lecturer
Tokyo University (Pharmaceutical Sciences Department): Invited Lecturer
Institute for Physical and Chemical Research, Tokyo: Invited Lecturer
Gulf Coast Chemistry Conference, Pensacola: Invited Lecturer
International Symposium on the Molecular Basis of Specificity of DNA-Antitumor Drug Interactions, Talloires: Invited Lecturer
NIH Workshop on Bioassays for Discovery of Antitumor and Antiviral Agents from Natural Sources, Bethesda: Invited Lecturer
Symposium on the Molecular Basis of Inorganic Pharmaceuticals, Northwestern University: Invited Lecturer

1989 *University of Miami* (Chemistry Department): Invited Lecturer
Johns Hopkins University (Pharmacology Department): Invited Lecturer
SUNY Binghamton (Chemistry Department): Invited Lecturer
University of Nebraska (Chemistry Department): Invited Lecturer
Gordon Research Conference on the Chemistry of Heterocyclic Compounds:

- Invited Lecturer
Royal Society of Chemistry Meeting on Molecular Mechanisms in Bioorganic Processes, Newcastle upon Tyne: Invited Lecturer
International Conference on Bioinorganic Chemistry, Cambridge, MA: Invited Lecturer
Virginia Commonwealth University (Biophysics Department): Invited Lecturer
Louisiana State University (Chemistry Department): Invited Lecturer
Georgia State University (Chemistry Department): Invited Lecturer
Ethyl Corporation (Baton Rouge): Invited Lecturer
Smith Kline & French Laboratories, King of Prussia: Invited Lecturer
- 1990
Lehigh University (Chemistry Department): Invited Lecturer
Merck Sharp & Dohme Research Laboratories, Rahway: Invited Lecturer
Muséum National d'Histoire Naturelle: Invited Lecturer
Centre National de la Recherche Scientifique, Toulouse (Laboratoire de Chimie de Coordination): Invited Lecturer
State University Leiden (Chemistry Department): Invited Lecturer
Cambridge University (Chemistry Department): Invited Lecturer
Technical University of Vienna (Chemistry Department): Invited Lecturer
Eidgenössische Technische Hochschule, Zurich (Chemistry Department): Invited Lecturer
Eidgenössische Technische Hochschule, Zurich (Biochemistry Department): Invited Lecturer
Université Louis Pasteur, Strasbourg (Chemistry Department): Invited Lecturer
American Chemical Society, 199th National Meeting, Boston, *Symposium on Oxygen Activation in Catalysis: Oxidations with Metalloenzymes*: Invited Lecturer
Roussel-Uclaf Table Ronde on Non-Porphyrinic Iron Oxidation Enzymes, Paris: Invited Lecturer
Institute of Cancer Research, Sutton: Invited Lecturer
9th International Round Table on Nucleosides, Nucleotides and their Biological Applications, Uppsala: Plenary Lecturer
University of Delaware (Chemistry Department): Invited Lecturer
North Carolina State University (Biochemistry Department): Invited Lecturer
Glaxo-University of North Carolina Symposium on Nucleic Acids in Catalysis and Drug Design: Invited Lecturer
Schering Pharmaceutical Research, Berlin: Invited Lecturer
Max Planck Institut für experimentelle Medizin, Göttingen: Invited Lecturer
Consiglio Nazionale delle Ricerche, Bologna: Invited Lecturer
A. Menarini Industrie Farmaceutiche, Rome: Invited Lecturer
Walter Reed Army Institute for Research: Invited Lecturer
Colloquium on DNA Drug Targeting, Institut Gustave Roussy, Villejuif: Invited Lecturer
University of Virginia (Division of Hematology/Oncology): Invited Lecturer
- 1991
Johns Hopkins University (Biochemistry Department): Invited Lecturer
French-American Chemical Society, 2nd Meeting, Captiva Island, Florida: Invited Lecturer
Vanderbilt University (Center in Molecular Toxicology): Invited Lecturer
Gordon Research Conference on Metals in Biology: Invited Lecturer
Muséum National D'Histoire Naturelle (Chemistry and Biophysics Departments): Lecture Series
Rhône-Poulenc, Vitry: Invited Lecturer
Université Joseph Fourier, (Chemistry Department), Grenoble: Invited Lecturer

Centre D'Etudes Nucleaires de Grenoble (Département de Chimie Structurale):
Invited Lecturer
Université de Montpellier (Pharmaceutical Sciences Dept.): Invited Lecturer
Institut de Chimie des Substances Naturelle, Gif-sur-Yvette: Invited Lecturer
*Centre National de la Recherche Scientifique, Toulouse (Laboratoire de Chimie
de Coordination):* Invited Lecturer
State University Leiden (Chemistry Department): Invited Lecturer
Centre Biophysique D'Orleans: Invited Lecturer
Purdue University (Chemistry Department): H.C. Brown Lectureship
Institut de Biologie Moléculaire et Cellulaire du CNRS, Strasbourg: Invited
Lecturer
Eidgenössische Technische Hochschule, Zurich (Chemistry Department): Invited
Lecturer
Ciba-Geigy, Basel: Invited Lecturer
Second Drug Discovery and Development Symposium, Grand Traverse: Invited
Lecturer
University of Virginia (Biochemistry Department): Invited Lecturer
North Carolina State University(Chemistry Department): Invited Lecturer
*Conference on Biomolecular Targeting Strategies in the Prevention and
Treatment of Disease, Charlottesville:* Invited Lecturer
American Chemical Society, 43rd Southeast Regional Meeting, Richmond:
Invited Lecturer
*Workshop on Molecular Aspects of the Sequence-Specific Binding of Metal
Compounds to Nucleic Acids, Royal Netherlands Academy of Arts and
Sciences, Haarlem:* Invited Lecturer

1992
Wake Forest University (Chemistry Department): Invited Lecturer
Oberlin College (Chemistry Department): Ralph Hirschmann Lectureship
Keystone Symposium on Molecular Biology/Metal Ion Interface, Lake Tahoe:
Invited Lecturer
Virginia Polytechnic Institute (Microbiology Department): Invited Lecturer
Virginia Polytechnic Institute (Chemistry Department): Invited Lecturer
*American Chemical Society Symposium on Natural Products, 203rd National
Meeting, San Francisco:* Invited Lecturer
*American Chemical Society, Symposium on DNA Cleavage and Viral
Inactivation, 24th Central Regional Meeting, Cincinnati:* Invited Lecturer
Memorial Sloan-Kettering Cancer Center: Invited Lecturer
*Symposium on Copper Coordination Chemistry: Bioinorganic Perspectives, Johns
Hopkins University, Baltimore:* Invited Lecturer
Carnegie Mellon University (Chemistry Department): Invited Lecturer
Johns Hopkins University (Division of Toxicological Sciences): Invited Lecturer
*International Conference on Structures, Conformations and Interactions of
Nucleic Acids, Fogarty International Center, National Institutes of Health:* Invited
Lecturer
Cruachem, Ltd., Glasgow: Invited Lecturer

1993
American University (Chemistry Department): Invited Lecturer
Institut de Biologie Moléculaire et Cellulaire du CRNS, Strasbourg: Invited
Lecturer
National Cancer Institute (Board of Scientific Counselors): Invited Lecturer
*American Chemical Society Symposium on Mechanistic Bioinorganic Chemistry,
205th National Meeting, Denver:* Invited Lecturer
Pennsylvania State University (Chemistry Department): Invited Lecturer
University of Illinois at Chicago (School of Pharmacy): Webster-Sibilsky

- Lecturer
University of Illinois at Chicago (Department of Medicinal Chemistry and Pharmacognosy): Invited Lecturer
Symposium on DNA Chemistry, Vanderbilt University, Nashville: Invited Lecturer
University of Minnesota (Department of Medicinal Chemistry): Invited Lecturer
University of Minnesota (Department of Chemistry): Invited Lecturer
Symposium on the Interfaces Between Chemistry & Biology, Marion Merrell-Dow, Cincinnati: Invited Lecturer
American Society of Pharmacognosy/Third Drug Discovery and Development Symposium, San Diego: Invited Lecturer
Bristol-Myers Squibb Pharmaceutical Research Institute, Seattle: Invited Lecturer
International Conference on Bioinorganic Chemistry, San Diego: Invited Lecturer
Hybridon, Worcester, MA: Invited Lecturer
New York University Medical Center (Department of Environmental Medicine): Invited Lecturer
- 1994
University of Utah (Departments of Chemistry and Medicinal Chemistry): Invited Lecturer
Boston College (Department of Chemistry): Invited Lecturer
University of Toledo (Department of Chemistry): Distinguished Biochemistry Lecturer
Scripps Research Institute (Department of Chemistry): Invited Lecturer
University of California, Santa Cruz (Department of Chemistry and Biochemistry): Invited Lecturer
Symposium on "Topoisomerase I Inhibitors: Molecules to Medicine", 85th Annual Meeting of the American Association for Cancer Research, San Francisco: Invited Lecturer
Merck Sharp & Dohme Research Laboratories (Biochemistry Department): Invited Lecturer
American Chemical Society, North Jersey Section: Invited Lecturer
Seton Hall University (Department of Chemistry): Invited Lecturer
- 1995
Winter Conference on Bioorganic & Medicinal Chemistry, Symposium on the Reemergence of Natural Products as a Source of New Therapeutics, Steamboat Springs, Colorado: Invited Lecturer
Georgia Institute of Technology (School of Chemistry and Biochemistry): Invited Lecturer
16th *International tRNA Workshop*, Madison, Wisconsin: Invited Lecturer
Nucleic Acids Symposium, Noordwijkerhout, the Netherlands: Invited Lecturer
American Chemical Society Symposium on Drug Targeting of RNA, 210th National Meeting, Chicago: Invited Lecturer
NATO Workshop on "DNA Cleavers and Chemotherapy of Cancer or Viral Diseases", Toulouse: Invited Lecturer
Université Louis Pasteur (Institut de Biologie Moléculaire et Cellulaire de CNRS), Strasbourg: Invited Lecturer
Stanford University (Department of Chemistry): Invited Lecturer
University of Missouri (Department of Chemistry): Invited Lecturer
University of Missouri (Department of Biochemistry): Invited Lecturer
Université Louis Pasteur (Magistère de Chimie-Biologie), Strasbourg: Invited Lecturer
University of Dundee (Department of Biochemistry): Invited Lecturer
- 1996
Ciba-Geigy (Central Research): Invited Lecturer

University of California, Riverside (Department of Chemistry): Invited Lecturer
University of California, San Diego (Department of Chemistry): Invited Lecturer
37th Annual Medicinal Chemistry Symposium, University of Buffalo: Invited Lecturer
Monroe Wall Symposium, Harvesting Biodiversity for Therapeutic Drugs and Foods, Xechem/Rutgers University, New Brunswick, NJ: Invited Lecturer
Symposium on DNA Photonucleases, 24th American Society for Photobiology Annual Meeting, Atlanta: Invited Lecturer
Gordon Research Conference on Natural Products Chemistry: Invited Lecturer
5th International Symposium on Progress in Natural Product Chemistry, Royal Society of Chemistry, Nottingham: Plenary Lecturer
Matt Suffness Symposium, 37th Annual Meeting of the American Society of Pharmacognosy, Santa Cruz: Invited Lecturer
American Chemical Society, Symposium on Mechanisms of Metal-Mediated Biopolymer Cleavage, 212th National Meeting, Orlando: Invited Lecturer
American Chemical Society Awards Symposium, 212th National Meeting, Orlando: Award Address
20th IUPAC Symposium on the Chemistry of Natural Products, Chicago: Plenary Lecturer
Virginia Polytechnic Institute and State University (Department of Biochemistry): Invited Lecturer

1997 *Workshop on Novel Biocatalysts*, Instituto Juan March de Estudios e Investigaciones, Madrid: Invited Lecturer
University of Sussex (Department of Chemistry): Invited Lecturer
SmithKline Beecham Pharmaceuticals Research Symposium, The Many Faces of RNA, Cambridge University: Invited Lecturer
Colorado State University (Department of Chemistry): Eli Lilly Lecturer
University of Illinois (School of Chemical Sciences): Nelson J. Leonard Distinguished Lecturer
Clemson University (Department of Chemistry): Invited Lecturer
17th International tRNA Workshop, Chiba, Japan: Invited Lecturer
22nd Seminar on Frontier Technology on "Structural Biology of RNA-Protein System", Tokyo, Japan: Invited Lecturer
4th Anticancer Drug Discovery and Development Symposium, Annapolis: Invited Lecturer
University of Virginia (Department of Pathology): Invited Lecturer
20th Gulf Coast Chemistry Conference, Pensacola: Invited Lecturer
University of Richmond (Department of Chemistry): Invited Lecturer
Louisiana State University (Department of Chemistry): Invited Lecturer
Symposium on "Drug Targeting of Topoisomerases", Fifth Chemical Congress of North America, Cancun, Mexico: Invited Lecturer
Université de Montréal (Département de Chimie): Servier Lecturer
McGill University (Department of Chemistry): Invited Lecturer

1998 *Johns Hopkins University* (Department of Pharmacology): Invited Lecturer
Scripps Research Institute (Department of Chemistry): Invited Lecturer
118th Annual Meeting of the Pharmaceutical Society of Japan, Kyoto: Invited Lecturer
Nippon Shinyaku Co., Ltd. (Research Laboratories): Invited Lecturer
Institute of Physical and Chemical Research (RIKEN): Invited Lecturer
Meiji Seika Kaisha Ltd. (Pharmaceutical Research Center): Invited Lecturer
University of Tokyo (Department of Chemistry and Biotechnology): Invited Lecturer

University of Iowa (Division of Medicinal and Natural Products Chemistry):
Invited Lecturer
RNA '98 (Third Annual Meeting of the RNA Society), Symposium on RNA
Therapeutics, Madison: Invited Lecturer
39th Annual Meeting of the American Society of Pharmacognosy, Orlando:
Award Address
University of Mississippi, Symposium on "Topoisomerase Targeting Agents:
Cancer to Chemotherapy": Invited Lecturer
25th Symposium on Nucleic Acids Chemistry, Kobe: Invited Lecturer
Okayama University (Department of Bioscience & Biotechnology): Invited
Lecturer
EMBO Workshop on Structure and Function of Aminoacyl-tRNA Synthetases,
Mittelwihr: Invited Lecturer
University of Tennessee (Department of Chemistry): Invited Lecturer

1999
Carnegie Mellon University (Department of Chemistry): Invited Lecturer
Gordon Research Conference on Carbohydrates: Invited Lecturer
University of Illinois (Department of Chemistry): Invited Lecturer
*AIMECS99: Asian Federation for Medicinal Chemistry International Medicinal
Chemistry Symposium*, Beijing: Plenary Lecturer
Beijing Medical College (Division of Chemical Sciences): Invited Lecturer
22nd Gulf Coast Chemistry Conference, Pensacola: Invited Lecturer
5th Anticancer Drug Discovery and Development Symposium, Detroit: Invited
Lecturer
Lehigh University (Department of Chemistry): Invited Lecturer
Brigham Young University (Department of Chemistry): Invited Lecturer
University of Utah (Department of Chemistry): Invited Lecturer
*AACR-NCI-EORTC International Conference on Molecular Targets and Cancer
Therapeutics*, Washington, DC: Plenary Lecturer
Banbury Conference on Strategies for Antibacterial Therapy, Cold Spring Harbor
Laboratory: Invited Lecturer

2000
University of Richmond (Department of Chemistry, joint with the Virginia Section
of the American Chemical Society): W. Allan Powell Lecturer
New York Academy of Sciences Conference on "The Camptothecins: Unfolding
Their Anticancer Potential", Washington, DC: Plenary Lecturer
Integrated DNA Technologies (Research Laboratories): Invited Lecturer
Symposium on RNA as a Drug Target, 220th American Chemical Society
National Meeting, Washington, DC: Invited Lecturer
Symposium on Advances in the Chemistry of Anticancer Drug Development,
British Pharmaceutical Conference, Birmingham, UK: Invited Lecturer
Muséum National D'Histoire Naturelle (Departement de Biophysique): Invited
Lecturer.
Centre National de la Recherche Scientifique, Toulouse (Laboratoire de Chimie
de Coordination): Invited Lecturer
Ecole Polytechnique, Palaiseau (Groupe de Biophysique): Invited Lecturer
9th Symposium on the Latest Trends in Organic Synthesis, Gainesville: Invited
Lecturer
Karolinska Institutet, Stockholm (Chemistry Department): Novum Lecturer in
Organic Chemistry
Karolinska Institutet, Stockholm (Biological Chemistry Program): Guest
Lecturer as editor of course textbooks
Université Victor Segalen, Bordeaux (Departement de Chimie Biologique):
Invited Lecturer

Université Joseph Fourier, Grenoble (Département de Chimie): Invited Lecturer
Centre d'Etudes Nucleaires de Grenoble (Département de Chimie Structurale):
Invited Lecturer
Muséum National D'Histoire Naturelle: Diplome d'Etudes Approfondies Lecturer
Centre Oscar Lambret (Institut de Recherches sur la Cancer): Invited Lecturer
Université René Descartes (Laboratoire de Chimie et Biochimie
Pharmacologiques et Toxicologiques): Invited Lecturer
State University Leiden (Chemistry Department): Invited Lecturer
Institut de Biologie Moléculaire et Cellulaire du CNRS, Strasbourg: Invited
Lecturer
Collège de France (Section de Chimie des Interactions Moléculaires): Invited
Lecturer

2001 *ISIS Pharmaceuticals: Invited Lecturer*
California Institute of Technology (Division of Chemistry and Chemical
Engineering): Invited Lecturer
National Cancer Institute (Screening Technologies Branch, Developmental
Therapeutics Program): Drug Discovery and Development Seminar
Wake Forest University, William Lown Symposium (School of Medicine):
Invited Lecturer
Aclara Biosciences (Protein Chemistry Department): Invited Lecturer
Institut de Recherches Cliniques de Montréal: Marcel-Piché Lecturer
ICN Pharmaceuticals (Biochemical R&D): Invited Lecturer
ISIS Pharmaceuticals: UCLA/ISIS Lectureship
UCLA (Department of Chemistry and Biochemistry): UCLA/ISIS Lectureship
Gordon Research Conference on Natural Products: Invited Lecturer
2nd Oxford Symposium on "Topoisomerase Targeting Agents: Chemistry to
Chemotherapy: Oxford, Mississippi: Invited Lecturer
Boston College (Department of Chemistry): Invited Lecturer
University of Connecticut (Department of Chemistry): Invited Lecturer
Brooklyn College CUNY (Department of Chemistry): Invited Lecturer

2002 *Asilomar Conference on Aminoacyl-tRNA Synthetases: Invited Lecturer*
ISIS Pharmaceuticals: Invited Lecturer
Lecture tour of western Switzerland, including
Université de Genève (Département de Chimie): Invited Lecturer
École Polytechnique Fédérale de Lausanne (Département de Chimie): Invited
Lecturer
University of Berne (Department of Chemistry): Invited Lecturer
University of Basel (Department of Chemistry): Invited Lecturer
University of Basel (Department of Biochemistry): Invited Lecturer
National Cancer Institute-Frederick (Developmental Therapeutics Program):
Invited Lecturer
Institut de Chimie des Substances Naturelle, Gif-sur-Yvette: Invited Lecturer
Southeastern Regional American Chemical Society Meeting, Nucleic Acids
Symposium, Charleston: Invited Lecturer
14th EORTC-NCI-AACR Symposium on Molecular Targets and Cancer
Therapeutics, Frankfurt: Invited Lecturer

2003 *International Symposium on Nucleic Acids: From Bases to Genomics, Paris:*
Invited Lecturer
4th Annual Florida Heterocyclic Conference, Gainesville: Invited Lecturer
University of Michigan (Department of Chemistry): Invited Lecturer
Frontiers in Chemical & Structural Biology, Montreal: Invited Lecturer

44th American Society of Pharmacognosy Meeting, Chapel Hill: Invited Lecturer
ACS Prospectives Conference on Combinatorial Chemistry, Leesburg: Invited Lecturer
Texas A&M (Chemistry/Biology Interface Program): Invited Lecturer
New York University (Department of Chemistry): Invited Lecturer
Université du Québec à Montréal (Département de Chimie): Boehringer-Ingelheim Lectureship
St. Jude's Children's Research Hospital, Memphis: Distinguished Lecturer in Pharmacology

2004 *Rutgers University* (Center for Molecular Biophysics and Biophysical Chemistry): Invited Lecturer
227th National ACS Meeting, Symposium on Protein Synthesis, Anaheim: Invited Lecturer
Kyoto University (Department of Chemistry): *Frontiers in Biological Chemistry* Lecturer
Nippon Shinyaku (Tsukuba Research Center): Invited Lecturer
AARS 2004: International Conference on Aminoacyl-tRNA Synthetases, Seoul, Korea: Invited Lecturer
RIKEN Symposium on RNA as a Therapeutic Target, Seoul, Korea: Invited Lecturer
National Institutes of Health (Laboratory of Biophysical Chemistry): Invited Lecturer
University of Baltimore, Maryland County (Department of Chemistry): Invited Lecturer
Indiana University (Department of Chemistry): Pfizer Lecturer in Organic Chemistry
PALUMED-CNRS Laboratoire de Chimie de Coordination Minisymposium, Toulouse: Invited Lecturer
Memorial Sloan-Kettering Cancer Center (Biological Chemistry Lecture Series): Invited Lecturer

2005 *Pennsylvania State University* (Department of Chemistry): Invited Lecturer
Memorial Sloan-Kettering Cancer Center (Interdepartmental Presentation): Invited Lecturer
National Cancer Institute, Frederick: Symposium on the Elaboration of Proteins Containing Modified Amino Acids: Invited Lecturer
27th Gulf Coast Chemistry Conference, Pensacola: Invited Lecturer
4th National Conference on Chemical Biology/International Symposium on the Interdisciplinary Science of Chemistry with Biology and Medicine, Wuhan, China: Plenary Lecturer
Memorial Symposium for Professor Jacques van Boom, Leiden: Invited Lecturer
International Chemical Congress of Pacific Basin Societies, Honolulu: Invited Lecturer

2006 *Ohio State University* (Department of Biochemistry): Invited Lecturer
Society for Industrial Microbiology Annual Meeting, Symposium on Recent Chemical and Enzymatic Strategies for Natural Products Diversification, Baltimore: Invited Lecturer
Albert Einstein College of Medicine (Department of Biochemistry): Invited Lecturer
Pennsylvania State University (Department of Chemistry), *Symposium in Honor of Professor Steven Weinreb*: Invited Lecturer
Iowa State University (Department of Chemistry): Invited Lecturer

- Dow/Karabatsos, Michigan State University (Department of Chemistry):*
 Distinguished Lectureship, Series of three Lectures
2006 International Conference on Aminocyl tRNA Synthetases (AARS 2006), San Diego: Invited Lecturer
- 2007 *Georgia Institute of Technology (Department of Chemistry):* Invited Lecturer
University of Utah (Department of Chemistry): Invited Lecturer
University of Pittsburgh (Department of Chemistry): Invited Lecturer
EMBO Workshop on DNA Supercoiling and Topoisomerases, Frejus, France:
 Invited Lecturer
University of Arizona (College of Pharmacy): Invited Lecturer
University of Louisville (James Graham Brown Cancer Center): Invited Lecturer
University of Illinois (School of Chemical Sciences): Invited Lecturer
Southeastern Regional ACS Meeting (SERMACS 2007): Symposium on Nucleic Acids; Structure and Interactions: Highlighted Speaker
Université de Montréal (Departments of Chemistry and Pharmacy): GRUM Lectureship
- 2008 *Friedreich's Ataxia Research Alliance Mitochondrial Summit Meeting, Tempe AZ:* Keynote Speaker
2008 International Conference on Aminocyl tRNA Synthetases (AARS 2008), Lac d'Annecy, France: Invited Lecturer
- 2009 *Isis Pharmaceuticals:* Invited Lecturer
University of Virginia: Sidney M. Hecht Lectureship
Institut de Chimie des Substances Naturelle, Gif-sur-Yvette: Invited Lecturer
Friedreich's Ataxia Research Alliance Therapeutics Symposium, Philadelphia: Invited Lecturer
Chemical Biology in the 21st Century, University of Buffalo, Buffalo, NY: Invited Lecturer
University of Missouri (Biochemistry Department): Invited Lecturer
University of Missouri (Chemistry Department): Invited Lecturer
Georgia State University (Chemistry Department): Invited Lecturer
Mayo Clinic Scottsdale: Research Project Update Seminar
- 2010 *General Electric Global Research:* Invited Lecturer
AIM 2010 (Third Ataxia Investigator's Meeting), Chicago: Invited Lecturer
Penwest Pharmaceuticals: Invited Lecturer
240th National ACS Meeting, Symposium on Recognition of DNA: Recent Advances, Boston: Invited Lecturer
Banner Sun Health Research Institute: Invited Lecturer
- 2011 *Academia Sinica, Taipei (Institute of Chemistry):* Invited Lecturer
Academia Sinica, Taipei (Genomics Research Institute): Invited Lecturer
National Taiwan University (Chemistry Department): Invited Lecturer
Friedreich's Ataxia Research Alliance (Board of Directors): Invited Lecturer
Institut de Biologie Moléculaire et Cellulaire du CNRS, Université de Strasbourg: Invited Lecturer
Institut de Science et d'Ingénierie Supramoléculaire, Université de Strasbourg, MiniSymposium on Chemical Stability of the Genome: Invited Lecturer
Pierre Fabre (Centre de Recherche et de Développement) : Invited Lecturer
1st International Conference on Chemical and Structural Biology of Nucleic Acids and Proteins for Novel Drug Discovery, Beijing: Invited Lecturer

- Peking University* (School of Pharmaceutical Sciences): Invited Lecturer
Wuhan University (College of Chemistry and Molecular Sciences): Invited Lecturer
University of Arizona (School of Pharmacy): Invited Lecturer
- 2012 *Arizona Alzheimer's Disease Consortium Retreat*, Tuba City, AZ: Invited Lecturer
Workshop on Mitochondria, Metabolism and Cancer, Tempe, AZ: Invited Lecturer
Université de Rouen (Chemistry Department): Invited Lecturer
2012 Arizona Alzheimer's Consortium Annual Scientific Conference, Barrow Neurological Institute, Phoenix: Invited Lecturer
Translational Medicine in Arizona. Networks, Partnerships and Initiatives, Flagstaff, AZ: Invited Lecturer
Joint Chinese Chemical Society-American Chemical Society Symposium, Annual Meeting of the Chinese Chemical Society, Sichuan University: Invited Lecturer
American Chemical Society Symposium, Shanghai Institute of Organic Chemistry: Invited Lecturer
Shanghai Institute of Materia Medica: Invited Lecturer
2012 IOCD International Conference on Functional Molecules in Nature, Nanjing, China: Plenary Lecturer
- 2013 *Lanzhou University* (College of Chemistry & Chemical Engineering): Invited Lecturer
The 9th SINO-US Chemistry Professors Conference, Sichuan University: Plenary Lecturer
Wuhan University (College of Chemistry & Molecular Sciences): Invited Lecturer
Peking University (School of Pharmaceutical Sciences): Invited Lecturer
Jacques Monod Conference on DNA Methylation and Demethylation, Roscoff, France: Invited Lecturer
AARS 2013 9th International Symposium on Aminoacyl-tRNA Synthetases, Hakone, Japan: Invited Lecturer
Evelyn F. McKnight Brain Institute Symposium, University of Arizona: Invited Lecturer
University of Colorado (Cancer Center): Invited Lecturer
- 2014 *Ohio State University*: University Molecular Life Sciences Seminar Series Lecturer
Arizona State University (Department of Chemistry and Biochemistry): Invited Lecturer
247th National ACS Meeting, Symposium on Frontiers of Nucleic Acid Chemistry, Dallas: Invited Lecturer
York University (Chemistry Department): Invited Lecturer
Isis Pharmaceuticals: Invited Lecturer
Mitochondrial Medicine 2014, United Mitochondrial Disease Foundation, Pittsburgh: Invited Lecturer.
Fusion Conference on Natural Products: A Celebration and a Resurrection with Reverse Pharmacology, Chicago: Plenary Lecturer
GlaxoSmithKline Mitochondrial Science Day, Collegeville, Pennsylvania: Invited Lecturer
Scripps Florida: External Seminar Series Lecturer
A-T Children's Project Workshop on Mitochondria and Metabolic Signaling in Ataxia-Telangiectasia, Tarrytown, New York: Invited Participant

- 2015 *Shanghai Institute of Materia Medica*: Invited Lecturer
Wuhan University (College of Chemistry and Molecular Sciences): Invited Lecturer
Nanjing University (Institute of Functional Biomolecules): Invited Lecturer
- 2016 *University of California at Irvine* (Departments of Chemistry and Pharmaceutical Sciences): Ionis Pharmaceuticals Lectureship
Genomics Institute of the Novartis Research Foundation: Invited Lecturer
Global Congress on Biochemistry, Glycomics & Amino Acids, San Antonio: Keynote Speaker
- 2017 *Peking University* (School of Pharmaceutical Sciences): Invited Lecturer
Xi'an Jiaotong University (School of Pharmacy): Invited Lecturer
19th ISANH International Conference on Oxidative Stress Reduction, Redox Homeostasis & Antioxidants, Paris, France: Invited Lecturer
ICAP 2017 5th International Conference on Analytical Proteomics, Caparica, Portugal: Invited Lecturer
Ionis Pharmaceuticals: Invited Lecturer
1st International Symposium on Frontiers of Natural and Biomimetic Drugs – Innovations on Drugs Driven by the Integration of Chemical Biology, Beijing Yanqi Lake Convention Center: Plenary Lecturer
Center for Cancer Research, National Cancer Institute: Molecular Discovery Seminar Series, Frederick, Maryland: Invited Lecturer
- 2018 *Merck Research Laboratories*, Kenilworth: Invited Lecturer
Michael Smith Symposium, University of Connecticut: Invited Lecturer
Sun Yat-sen University (School of Pharmaceutical Sciences): Invited Lecturer
- 2019 *Southern Medical University* (School of Pharmaceutical Sciences), Guangzhou: Invited Lecturer
Shanghai Institute of Materia Medica, Shanghai: Invited Lecturer
Wuhan University (College of Chemistry and Molecular Sciences): Invited Lecturer
Huazhong University of Science and Technology (College of Pharmacy), Wuhan: Invited Lecturer
Hunan University (Department of Chemistry), Changsha: Invited Lecturer
Peking University (School of Pharmaceutical Sciences): Invited Lecturer
Tsinghua University (Department of Chemistry, Beijing): Invited Lecturer
Baekeland Award Symposium, Fairleigh Dickinson University: Invited Lecturer
- 2020 *Arizona State University* (School of Molecular Sciences): Invited Lecturer

Editorial

- 1986-02 Editorial Advisory Board, *Anti-Cancer Drug Design*
1987-90 Editorial Advisory Board, *Chemical Research in Toxicology*
1989-95 Invited Expert Analyst, *Chemtracts-Organic Chemistry*
1990-91 Associate Editor, *Medicinal Chemistry Research*
1991-98 Editorial Advisory Board, *Journal of Molecular Recognition*
1992-03 Editorial Advisory Board, *Bioconjugate Chemistry*
1992-21 Associate Editor, *Journal of the American Chemical Society*

- 1993-98 Bioorganic Chemistry Series Editor, Oxford University Press
 1996-97 Guest Editor, Symposium-in-Print on "Strategies for RNA Recognition",
Bioorganic & Medicinal Chemistry
 1997-99 Editorial Advisory Board, *Molecules Online*
 2000-05 Editorial Advisory Board, *Current Medicinal Chemistry-Anticancer Agents*
 2001-05 Editorial Advisory Board, *Molecular Cancer Therapeutics*
 2002-13 Editorial Advisory Board, *Oncology Research/Anticancer Drug Design*

Committees/National Service

- 1978 Co-organizer (with H. Umezawa), East-West Conference on Bleomycin
 1979 Organizer, Symposium on Antitumor Agents, ACS National Meeting - Houston
 1981-83 Member, Bioorganic and Natural Products Study Section, National Institutes of Health
 1984 Organizer, Symposium, ACS Regional Meeting - Raleigh/Durham
 1985-89 Member, Walter Reed Scientific Advisory Board
 1986 Ad hoc member, Chemical Pathology Study Section, National Institutes of Health
 1986-90 Member, California Institute of Technology Chemistry and Chemical Engineering Division Visiting Committee
 1987-91 Member, Advisory Board, Research Institute of Pharmaceutical Sciences, University of Mississippi
 1988 Ad hoc member, Bioorganic and Natural Products Study Section, National Institutes of Health
 1988 Ad hoc member, Metallobiochemistry Study Section, National Institutes of Health
 1988-92 Chairman, Chemical Technologies Advisory Board, SmithKline Beecham Pharmaceuticals
 1989-94 Member, Board of Directors, Harbor Branch Oceanographic Institution
 1989 Member, Ad Hoc Advisory Committee, Antitumor and Anti-HIV Drug Discovery Screening Program, Division of Cancer Treatment, National Cancer Institute
 1990-00 Member, R&D Advisory Board, SmithKline Beecham Pharmaceuticals
 1990 Organizer, Symposium on BioOrganic Chemistry, University of Virginia Chemistry Department
 1991 Co-organizer (with C. Evans) Conference on Biomolecular Recognition and Targeting Strategies in the Prevention and Treatment of Disease, Charlottesville
 1991-92 American Chemical Society Committee for the preparation of "Science & Serendipity. The Importance of Basic Research"
 1992 Member, Review Panel for National Cooperative Drug Discovery Group Applications, National Cancer Institute
 1992-93 Chairman, Review Panel for Laboratory of Medicinal Chemistry, National Cancer Institute
 1992-97 Member, Scientific Advisory Board, Cruachem, Ltd.
 1993-95 Member, Board of Scientific Counselors, Division of Cancer Treatment, National Cancer Institute
 1993-97 Member, Scientific Advisory Board, Magainin Pharmaceuticals
 1993-97 Chairman, Discovery Advisory Board, SmithKline Beecham Pharmaceuticals
 1994 Member, Review Panel for Laboratory of Molecular Pharmacology, National Cancer Institute
 1994 Chairman, Department of the Army Molecular Biology Review Panel for Breast Cancer Proposals
 1995 Chairman, Review Panel for Laboratory of Drug Discovery Research & Development, National Cancer Institute
 1995-10 Member, Board of Directors, Orchid Cellmark

1997-99 Chairman, Scientific Advisory Board, Orchid BioSciences
 1998-99 Member, Corporate Technology Board, SmithKline Beecham Pharmaceuticals
 1998-01 Member, Board of Directors, Annovis, Inc.
 1999 Chairman, Special Emphasis Review Panel, National Cancer Institute
 2000-09 Member, Board of Directors, Pinnacle Pharmaceuticals
 2000-10 Member, Scientific Advisory Board, PALUMED
 2000-06 Member, Scientific Advisory Board, Xenogen
 2002-05 Chairman, Scientific Advisory Board, Galileo Pharmaceuticals
 2005-08 Member, Board of Directors, Edison Pharmaceuticals
 2005-08 Chairman, Scientific Advisory Board, Edison Pharmaceuticals
 2005-08 Member, Scientific Advisory Board, Anacor Pharmaceuticals
 2010 Ad hoc Member, Synthetic and Biological Chemistry B Study Section, National Institutes of Health
 2014 Ad hoc Member, Synthetic and Biological Chemistry B Study Section, National Institutes of Health
 2014 Participant, FARA/NCATS Biomarker meeting
 2015 Ad hoc Member, Synthetic and Biological Chemistry A Study Section, National Institutes of Health
 2017 Ad hoc Member, Synthetic and Biological Chemistry A Study Section, National Institutes of Health
 2018- Member, Scientific Advisory Board, Friedreich's Ataxia Research Alliance

Consulting

1979-81 Merck Sharp & Dohme Research Laboratories
 1987-00 SmithKline Beecham Pharmaceuticals
 1989-94 Harbor Branch Oceanographic Institution
 1992-97 Cruachem, Ltd.
 1993-97 Magainin Pharmaceuticals
 1997-99 Orchid BioSciences
 1997-01 Annovis, Inc.
 2000-06 Xenogen, Inc.
 2000-10 Pinnacle Pharmaceuticals
 2000-10 PALUMED
 2001- Ionis Pharmaceuticals
 2001-05 Galileo Pharmaceuticals
 2005-08 Edison Pharmaceuticals
 2005-07 Anacor Pharmaceuticals
 2018 Merck Inc.

Research Interests

- carbohydrates that selectively target cancer cells
- modification of bacterial ribosomes to enable the incorporation of non-alpha amino acids
- targeting of mitochondria by the use of a novel mitochondrial nitroreductase activity
- Study of the mitochondrial respiratory chain; development of drugs for treating mitochondrial dysfunction

Sidney M. Hecht

Research Publications

- (1) D. P. Brust, D. S. Tarbell and S. M. Hecht, Studies of Cyclizations of an O-(α -Methylallyl)phenol and the Corresponding Methyl Ether Induced by Electrophilic Reagents, Proc. Natl. Acad. Sci. USA, **53**, 233-236 (1965).
- (2) D. P. Brust, D. S. Tarbell, S. M. Hecht, E. C. Hayward and L. D. Colebrook, Preparation of *cis*- and *trans*-2,3-Dimethyl-2,3-dihydrobenzofurans and Related Compounds. Cyclization Involving Oxonium Ions, J. Org. Chem., **31**, 2192-2201 (1966).
- (3) N. J. Leonard and S. M. Hecht, 6-(3-Methylbut-3-enylamino)purine: A Highly Active Cytokinin, J. C. S. Chem. Commun., 973 (1967).
- (4) S. M. Hecht, J. P. Helgeson and T. Fujii, N-(3-Methyl-2-butenyl)adenine, "Synthetic Procedures in Nucleic Acid Chemistry", John Wiley-Interscience Publishers, New York, 1968, p. 8-10.
- (5) N. J. Leonard, S. M. Hecht, F. Skoog and R. Y. Schmitz, Cytokinins: Synthesis of 6-(3-Methyl-3-butenylamino)-9- β -D-ribofuranosylpurine (3iPA), and the Effect of Side-Chain Unsaturation on the Biological Activity of Isopentylaminopurines and their Ribosides, Proc. Natl. Acad. Sci. USA, **59**, 15-21 (1968).
- (6) W. J. Burrows, D. J. Armstrong, F. Skoog, S. M. Hecht, J. T. A. Boyle, N. J. Leonard and J. Occolowitz, Cytokinin from Soluble RNA of *Escherichia coli*: 6-(3-Methyl-2-butenylamino)-2-methylthio-9- β -D-ribosuranosylpurine, Science, **161**, 691-693 (1968).
- (7) N. J. Leonard, S. M. Hecht, F. Skoog and R. Y. Schmitz, Cytokinins: Synthesis and Biological Activity of Related Derivatives of 2iP, 3iP, and their Ribosides, Israel J. Chem., **6**, 539-550 (1968).
- (8) N. J. Leonard, S. M. Hecht, F. Skoog and R. Y. Schmitz, Cytokinins: Synthesis, Mass Spectra and Biological Activity of Compounds Related to Zeatin, Proc. Natl. Acad. Sci. USA, **63**, 175-182 (1969).
- (9) S. M. Hecht, A. S. Gupta and N. J. Leonard, Mass Spectra of Nucleoside Components of tRNA, Anal. Biochem., **30**, 249-270 (1969).
- (10) S. M. Hecht, A. S. Gupta and N. J. Leonard, Position of Uridine Thiation: The Identification of Minor Nucleosides from Transfer RNA by Mass Spectrometry, Biochem. Biophys. Acta, **182**, 444-448 (1969).
- (11) W. J. Burrows, D. J. Armstrong, F. Skoog, S. M. Hecht, J. T. A. Boyle, N. J. Leonard and J. Occolowitz, The Isolation and Identification of Two Cytokinins from *Escherichia coli* Transfer Ribonucleic Acids, Biochemistry, **8**, 3071-3076 (1969).
- (12) S. M. Hecht, N. J. Leonard, J. Occolowitz, W. J. Burrows, D. J. Armstrong, F. Skoog, R. M. Bock, I. Gillam and B. M. Tener, Cytokinins: Isolation and Identification of 6-(3-Methyl-2-butenylamino)-9- β -D-ribofuranosylpurine (2iPA) from Yeast Cysteine tRNA, Biochem. Biophys. Res. Commun., **35**, 205-209 (1969).

- (13) S. M. Hecht, N. J. Leonard, W. J. Burrows, D. J. Armstrong, F. Skoog and J. Occolowitz, Cytokinin from the Transfer RNA of Wheat Germ: 6-(4-Hydroxy-3-methyl-2-butenylamino)-2-methylthio-9- β -D-ribofuranosylpurine, Science, **166**, 1272-1274 (1969).
- (14) S. M. Hecht, N. J. Leonard, R. Y. Schmitz and F. Skoog, Cytokinins: Synthesis and Growth-Promoting Activity of 2-Substituted Compounds in the N⁶-Isopentenyladenine and Zeatin Series, Phytochemistry, **9**, 1173-1180 (1970).
- (15) D. J. Armstrong, P. K. Evans, W. J. Burrows, F. Skoog, J. F. Petit, J. Dahl, T. Steward, J. L. Strominger, N. J. Leonard, S. M. Hecht and J. Occolowitz, Cytokinins: Activity and Identification in *Staphylococcus epidermidis* Transfer RNA, J. Biol. Chem., **245**, 2922-2926 (1970).
- (16) S. M. Hecht, N. J. Leonard, R. Y. Schmitz and F. Skoog, Cytokinins: Influence of Side Chain Planarity of N⁶-Substituted Adenines and Adenosines on Cell Division and Growth, Phytochemistry, **9**, 1907-1913 (1970).
- (17) W. J. Burrows, D. J. Armstrong, M. Kaminek, F. Skoog, R. M. Bock, S. M. Hecht, L. G. Dammann, N. J. Leonard and J. Occolowitz, The Isolation and Identification of Cytokinins from the Transfer Ribonucleic Acids of Wheat Germ, Biochemistry, **9**, 1867-1872 (1970).
- (18) S. M. Hecht, Mass Spectrometric Identification of Some Prenylaminopurines, Biochim. Biophys. Acta, **213**, 269-272 (1970).
- (19) S. M. Hecht, R. M. Bock, N. J. Leonard, R. Y. Schmitz and F. Skoog, Cytokinin Activity in tRNA^{Phe}, Biochem. Biophys. Res. Commun., **41**, 435-440 (1970).
- (20) S. M. Hecht, A. S. Gupta and N. J. Leonard, Mass Spectra of Ribonucleoside Components of tRNA. II., Anal. Biochem., **38**, 230-251 (1970).
- (21) R. Y. Schmitz, F. Skoog, S. M. Hecht and N. J. Leonard, Cytokinins: Synthesis and Biological Activity of Zeatin Esters and Related Compounds, Phytochemistry, **10**, 275-280 (1971).
- (22) S. M. Hecht, L. H. Kirkegaard and R. M. Bock, Chemical Modifications of tRNA Species. Desulfurization with Raney Nickel, Proc. Natl. Acad. Sci. USA, **68**, 48-51 (1971).
- (23) M. Sundaralingam., C. D. Stout and S. M. Hecht, The Structure of Bis(4-aminoimidazole-5-carboxamidoxime)copper(II) perchlorate, a Degradation Product of Adenine N¹-oxide, J.C. S. Chem. Commun., 240-241 (1971).
- (24) S. M. Hecht, R. M. Bock, R. Y. Schmitz, F. Skoog, N. J. Leonard and J. Occolowitz, Question of the Function of the Ribosyl Moiety in the Promotion of Callus Growth by Exogenously Added Cytokinins, Biochemistry, **10**, 4224-4228 (1971).
- (25) S. M. Hecht, The Mass Spectra of Some Heterocycles Related to N⁶-(Δ^2 -Isopentenyl)adenosine, Anal. Biochem., **44**, 262-275 (1971).
- (26) S. M. Hecht and R. M. Bock, Chemical Modifications of Transfer RNA Species. Metal Ion Binding to Monoperphthalate-Treated tRNA, Biochem. Biophys. Res. Commun., **45**, 416-420 (1971).

- (27) S. M. Hecht and R. M. Bock, R. Y. Schmitz, F. Skoog and N. J. Leonard, Cytokinins: Development of a Potent Antagonist, Proc. Natl. Acad. Sci. USA, **68**, 2608-2610 (1971).
- (28) S. M. Hecht and J. J. McDonald, The Mass Spectra of Some N⁶-acyladenines and 6-Substituted Ureidopurines, Anal. Biochem., **47**, 157-173 (1972).
- (29) R. Y. Schmitz, F. Skoog, S. M. Hecht, R. M. Bock and N. J. Leonard, Comparison of Cytokinin Activities of Naturally Occurring Ribonucleosides and Corresponding Bases, Phytochemistry, **11**, 1603-1610 (1972).
- (30) S. M. Hecht and J. W. Kozarich, A Convenient Method for the Production of Diazomethane-d₂, Tetrahedron Lett., 1501-1502 (1972).
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- (32) S. M. Hecht and M. Sundaralingam, Stereochemistry of Nucleic Acids and Their Constituents. XXVII. The Crystal and Molecular Structure of a 1:1 Adduct of Ethanol and 3'-Deoxy-3'-(dihydroxyphosphinylmethyl)adenosine, an Analog of 3'-AMP, J. Am. Chem. Soc., **94**, 4314-4319 (1972).
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- (34) R. C. Gallo, S. M. Hecht, J. Whang-Peng and S. O'Hopp, N⁶-(Δ^2 -isopentenyl)adenosine. The Regulatory Effect of a Cytokinin and Modified Nucleoside from tRNA on Human Lymphocytes, Biochem. Biophys. Acta, **28**, 488-500 (1972).
- (35) S. M. Hecht and J. W. Kozarich, The Base-Induced Decomposition of N-Nitroso-N-methylurea, Tetrahedron Lett., 5147-5150 (1972).
- (36) F. Skoog, R. Y. Schmitz, R. M. Bock and S. M. Hecht, Cytokinin Antagonists: Synthesis and Physiological Effects of 7-Substituted-3-methylpyrazolo[4,3-d]pyrimidines, Phytochemistry, **12**, 25-37 (1973).
- (37) S. M. Hecht and J. W. Kozarich, Diazomethane: Its *in situ* Generation and Utilization in Selective Methylations, Tetrahedron Lett., 1397-1400 (1973).
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- (39) S. M. Hecht and J. W. Kozarich, Demethylation of 7-Methylguanosine with Lithium 2-Methylpropane-2-thiolate, J. C. S. Chem. Commun., 387-388 (1973).
- (40) S. M. Hecht, S. D. Hawrelak, J. W. Kozarich, F. J. Schmidt and R. M. Bock, Chemical Modifications of Transfer RNA Species. Synthesis of tRNA's Terminating in 2'- and 3'-O-Methyladenosine, Biochem. Biophys. Res. Commun., **52**, 1341-1347 (1973).
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- (43) S. M. Hecht and J. W. Kozarich, A Chemical Synthesis of γ -³²P-Adenosine 5'-triphosphate, Biochem. Biophys. Acta, **331**, 307-309 (1973).
- (44) J. P. Helgeson, G. T. Haberlach and S. M. Hecht, On the Inhibition of Tobacco Callus and Suspension Culture by Pyrazolo[4,3-d]pyrimidine Analogs of Cytokinins, Proc. 8th Intern. Conf. on Plant Growth Subst., Tokyo, 1973, pp. 485-493.
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- (60) S. M. Hecht, Utilization of Isomeric Aminoacyl-tRNA's in Peptide Bond Formation, Accts. Chem. Res., **10**, 239-245 (1977).
- (61) S. M. Hecht, P. Arcari and B. L. Adams, Isoenergetic Hydride Transfer. A Phase-Transition Mediated, Reversible tRNA Modification, J. Am. Chem. Soc., **99**, 3890-3892 (1977).
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- (72) D. L. Evans, D. K. Minster, U. Jordis, S. M. Hecht, A. L. Mazzu and A. I. Meyers, Nickel Peroxide Dehydrogenation of O, S and N-Containing Heterocycles, J. Org. Chem., **44**, 497-501 (1979).
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