Preface

The Nineteenth American Peptide Symposium (APS) was held in San Diego, California on June 18-23, 2005. More than 1,000 scientists, accompanying persons, and exhibitors from all over the world attended the conference, and as Editor of the Proceedings of the 19th APS, I am very pleased to share the state-of-the art research projects and ideas that were presented during this event.

The symposium began with a special session focused on protein design co-sponsored by the Protein Society and the American Peptide Society to encourage discussion between two complementary fields of science. For example, the contribution in this book by Dr. Etzkorn on the mechanism of peptidyl-prolyl isomerase clearly shows how short peptides can be used as tools to investigate the biology of larger protein. This session organized by Dr. Jeff Kelly, President-Elect of the Protein Society and co-Chair of the 19th APS was a great success and opened future opportunities for interactions between the two societies.

The increasing active participation of young investigators to the field of peptide research was clearly seen with the outstanding lectures at the Bert Schram Young Investigator mini-symposium sponsored by the Escom Science Foundation and chaired by Dr. John P. Mayer and Dr. Alain Fournier (a number of which are described in this Proceedings), and the large number of poster entries for the Young Investigator's Poster Competition (organized by Dr. DeAnna Long).

As demonstrated by the contributions to this Proceedings, the topics of the Symposium covered cutting-edge research presented by a wide range of distinguished speakers. As outlined by the contribution by Dr. Richard Houghten, recipient of the Merrifield Award, as well as the Goodman Memorial Session, the progresses in peptide and peptidomimetic chemistry are driven by the need to develop novel therapeutics or tools to understand biological natural events. Novel approaches to generate peptides by biological means were also presented at this symposium. Other increasing topics included quorum sensing, post-translational modifications of peptides, peptide quaternary structures in material science and disease, and proteomics.

I wish to thank all authors of the contributions for their efforts and their willingness to participate to this book, and Michael Chorev and Donna Freher-Lyons for their assistance in the preparation of this book. Lastly, I wish to give special thank to my husband and daughter for their support and encouragement in preparing the Proceedings of the 19th American Peptide Symposium.

Sylvie Blondelle

Message from the President of the American Peptide Society

The 19th American Peptide Symposium was another successful addition to the American Peptide Society's series of biennial symposia. An international group of 980 registrants from 33 countries contributed to the high quality program that is documented in this volume. Thank you to all of the lecturers and poster presenters for your excellent contributions. Congratulations to co-chairs Jeffery Kelly and Tom Muir along with their staff and the organizing and program committees for a successful meeting. Thank you also to all of our sponsors and exhibitors. And finally, thank you to Past President Roger Freidinger for his oversight of this effort.

The American Peptide Society recognized the achievements of outstanding scientists involved in peptide science through several awards and special sessions at the symposium. Richard Houghten of the Torrey Pines Institute for Molecular Studies was the recipient of the 2005 R. Bruce Merrifield Award, which recognizes outstanding career achievements in peptide science. Richard described his pioneering work on combinatorial chemistry in his lecture "From Tens to Trillions: Advances in Synthetic Combinatorial and Diversity Oriented Methods over the Past 20 Years." Robin Offord of the University of Geneva presented the Makineni lecture, which honors long time peptide science supporter Rao Makineni, and described his research on medicinal chemistry applied to a synthetic protein. The Dr. Bert L. Schram Young Investigators Mini-symposium that started off the meeting on Saturday and the Young Investigators Poster Competition highlighted the accomplishments of young scientists in our field. The Society presented 59 Travel Awards, totaling $31,000, to young scientists from all over the world so that they could present their research at the symposium. The Murray Goodman Memorial Session honored our good friend and colleague, a leader who influenced our field and the people in it in so many ways – through his research, his mentoring, his service to the Society as President, and as Founding Editor of *Biopolymers (Peptide Science)*. Murray will be greatly missed by his friends and colleagues.

American Peptide Society activities go beyond those at the symposium. American Peptide Society members receive *Biopolymers (Peptide Science)*, the official society journal which publishes both original research and review articles, in print and electronic forms as part of their membership so that they can keep abreast of advances in our field in between symposia. All Society members are invited to submit manuscripts to the journal. The American Peptide Society is now a full member of the Federation of American Societies for Experimental Biology (FASEB). Our membership in FASEB increases the visibility of our Society in the biomedical research community, provides the benefits of FASEB membership to our members and allows our participation in FASEB public affairs initiatives. Other activities and special discounts for Society members are described on the society website www.americanpeptidesociety.com.

We're looking ahead to the 20th American Peptide Symposium that will be held June 26-30, 2007 in Montreal. Co-chairs Emanuel Escher and William Lubell are working hard on assembling an exciting program with the theme "Peptides for

Youth." I look forward to working with you in American Peptide Society activities and seeing you in Montreal in 2007.

My best wishes for success in your peptide activities!

Jane V. Aldrich
University of Kansas

19th American Peptide Symposium

June 18-23, 2005
San Diego, California

Co-Chairs

Jeffery W. Kelly, Ph.D.
Scripps Research Institute
Department of Chemistry, MB 12
10550 N. Torrey Pines Road
La Jolla, CA 92037
jkelly@scripps.edu

Tom W. Muir, Ph.D
Rockefeller University
Synthetic Protein Chemistry Lab
1230 York Avenue, MC 223
New York, NY 10021
muirt@rockvax.rockefeller.edu

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Richard A. Houghten, Ph.D., Torrey Pines Institute for Molecular Studies
Jeffery W. Kelly, Ph.D., Scripps Research Institute
William D. Lubell, Ph.D., University of Montreal
Hisakazu Mihara, Ph.D., Tokyo Institute of Technology
Tom W. Muir, Ph.D., Rockefeller University

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Jeffery W. Kelly, Ph.D., Scripps Research Institute
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The American Peptide Society

The American Peptide Society (APS), a nonprofit scientific and educational organization founded in 1990, provides a forum for advancing and promoting knowledge of the chemistry and biology of peptides. The approximately one thousand members of the Society come from North America and from more than thirty other countries throughout the world. Establishment of the American Peptide Society was a result of the rapid worldwide growth that has occurred in peptide-related research, and of the increasing interaction of peptide scientists with virtually all fields of science.

The American Peptide Society is a Sustaining Associate Member of the Federation of American Societies for Experimental Biology (FASEB). Our affiliation with FASEB increases the visibility of our Society in the biomedical research community and allows our participation in any FASEB public affairs initiatives.

Biopolymers (Peptide Science) is the official journal of the American Peptide Society. A full year subscription to this journal is automatically included with membership in the APS. The journal publishes both original articles and reviews covering all aspects of peptide science. Eminent peptide scientists Lila Gierasch and Charles Deber serve as the journal editor and current trends editor, respectively, and they welcome your manuscript submissions. Members also have free access to the Society's continually evolving web site where the latest information on American Peptide Society activities and developments in peptide science may be found. Free professional position and resume posting is offered at the site. Membership in the American Peptide Society is open to scientists throughout the world who are interested in the chemistry or biology of peptides and small proteins. The American Peptide Society strongly believes in supporting the young scientists entering our field. Reduced membership rates for students and postdoctoral fellows are provided. Information on the American Peptide Society is available at the society website www.americanpeptidesociety.com.

American Peptide Symposia

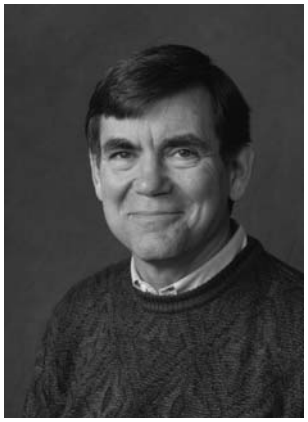
Symposium	*Year*	*Chair (s)*	*Location*
1st	1968	Saul Lande *Yale University* Boris Weinstein *University of Washington-Seattle*	Yale University New Haven, CT
2nd	1970	F. Merlin Bumpus *Cleveland Clinic*	Cleveland Clinic Cleveland, OH
3rd	1972	Johannes Meienhofer *Harvard Medical School*	Children's Cancer Research Foundation, Boston, MA
4th	1975	Roderich Walter *University of Illinois Medical Center – Chicago*	The Rockefeller University and Barbizon Plaza Hotel New York, NY
5th	1977	Murray Goodman *University of California San Diego*	University of California - San Diego, San Diego, CA
6th	1979	Erhard Gross *National Institutes of Health*	Georgetown University Washington, DC
7th	1981	Daniel H. Rich *University of Wisconsin- Madison*	University of Wisconsin-Madison, Madison, WI
8th	1983	Victor J. Hruby *University of Arizona*	University of Arizona Tucson, AZ
9th	1985	Kenneth D. Kopple *Illinois Institute of Technology* Charles M. Deber *University of Toronto*	University of Toronto Toronto, Ontario, Canada
10th	1987	Garland R. Marshall *Washington University School of Medicine*	Washington University St. Louis, MO
11th	1989	Jean E. Rivier *The Salk Institute for Biological Studies*	University of California-San Diego, San Diego, CA
12th	1991	John A. Smith *Massachusetts General Hospital*	Massachusetts Institute of Technology, Cambridge, MA
13th	1993	Robert S. Hodges *University of Alberta-Edmonton*	Edmonton Convention Center Edmonton, Alberta, Canada
14th	1995	Pravin T.P. Kaumaya *The Ohio State University*	The Ohio State University Columbus, OH
15th	1997	James P. Tam *Vanderbilt University*	Nashville Convention Center Nashville, TN
16th	1999	George Barany *University of Minnesota* Gregg B. Fields *Florida Atalantic University*	Minneapolis Convention Center Minneapolis, MN
17th	2001	Richard A. Houghten *Torrey Pines Institute for Molecular Studies*	Town and Country Resort Hotel San Diego, CA

		Michal Lebl *Spyder Instruments and Illumina*	
18th	2003	Michael Chorev *Beth Israel Deaconess Medical Center* Tomi K. Sawyer *ARIAD Pharmaceuticals*	Marriott Copley Place Boston, MA
19th	2005	Jeffery Kelly *Scripps Research Institute* Tom Muir *Rockefeller University*	Town and Country Resort Hotel San Diego, CA

The Merrifield Award

Endowed by Rao Makineni (1997)
Sponsored by the Pierce Chemical Company (1977-1995)

Richard A. Houghten



Dr. Richard A. Houghten, founder and President of Torrey Pines Institute for Molecular Studies, received his doctorate in organic chemistry from the University of California, Berkeley, in 1975. Following positions at the University of California, San Francisco, and Mount Sinai School of Medicine, he joined the Scripps Research Institute in 1981. Torrey Pines Institute for Molecular Studies began operations in 1989 with eight employees. Now in its 17th year, it has become internationally recognized for its scientific contributions in a wide range of fields, including chemistry, multiple sclerosis, diabetes, immunology, infectious disease, heart disease, cancer vaccines and pain management. The institute has grown to include over 65 scientists, technicians and administrative staff, all of whom work in an environment that emphasizes personal and professional growth by encouraging the development of independent research ideas as well as the development of collaborative efforts with scientists throughout the world. Dr. Houghten's scholarly contributions include over 500 publications and 60 issued patents. He also founded the journal, The Journal of Peptide Research and is active on several other editorial boards.

In addition to Torrey Pines Institute for Molecular Studies, Dr. Houghten founded three commercial businesses, one of which became a publicly-traded biotechnology company. His achievements have been recognized in the form of numerous honors and awards. Most recently, his contribution to the field of peptide science was acknowledged by the 2004 Ralph F. Hirschmann Award in Peptide Chemistry. Other honors received include the Vincent du Vigneaud Award for Excellence in Peptide Science (2000) and the UCSD Connect Athena Pinnacle Award for Empowering Women in the Workplace. His acceptance of the Athena Pinnacle Award in 1999 further distinguishes Dr. Houghten and his dedication to the mentoring and advancement of women scientists in the work place.

Dr. Houghten's scientific contributions include the "tea bag" approach, which was originally utilized to facilitate the synthesis of peptides. The tea bag method, in which solvent permeable packets are used during the synthesis process, has now resulted in not only the synthesis of millions of peptides, but also the synthesis of millions of low molecular weight compounds. In collaboration with his long time associates and colleagues at Torrey Pines Institute for Molecular Studies, he has also developed approaches in combinatorial chemistry which are invaluable for the rapid identification of individual compounds from millions to billions of others (positional

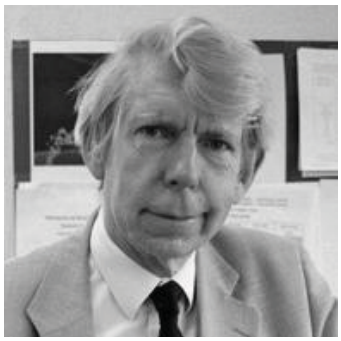
scanning), the use of existing combinatorial libraries to generate entirely new diversities of compounds (libraries from libraries), the cross-referencing of library screening results with gene data bases in order to fine-tune the direction towards which further testing moves for a given disease target (biometrical analysis), and novel volatilizable solid supports.

2005 – Richard A. Houghten, Torrey Pines Institute for Molecular Studies
2003 – William F. DeGrado, University of Pennsylvania, School of Medicine
2001 – Garland R. Marshall, Washington University Medical School
1999 – Daniel H. Rich, University of Wisconsin – Madison
1997 – Shumpei Sakakibara, Peptide Institute, Inc.
1995 – John M. Stewart, University of Colorado – Denver
1993 – Victor J. Hruby, University of Arizona – Tucson
1991 – Daniel F. Veber, Merck Sharp & Dohme, Inc.
1989 – Murray Goodman, University of California, San Diego
1987 – Choh Hao Li, University of California, San Francisco
1985 – Robert Schwyzer, Swiss Federal Institute of Technology
1983 – Ralph F. Hirschmann, Merck Sharp & Dohme, Inc.
1981 – Klaus Hofmann, University of Pittsburgh, School of Medicine
1979 – Bruce Merrifield, The Rockfeller University
1977 – Miklos Bodansky, Case Western Reserve University

The Makineni Lecture Award

Endowed by PolyPeptide Laboratories, Inc., and Murray and Zelda Goodman
Sponsored by the American Peptide Society

Robin E. Offord



Professor E. Robin Offord began in nuclear physics but soon changed to biology. He first worked at the Medical Research Council Laboratory, Cambridge, U.K. (1962-1966), in the group Frederick Sanger where he obtained his Doctorate and collaborated with, among others, César Milstein and Aaron Klug. He taught and researched at Oxford from 1966 – 1980 (University Lecturer in Molecular Biophysics, Tutor, Christ Church), when he left to become Director of the Département de Biochimie Médicale at Geneva. He was also President of Basic Medicine in Geneva from 1994 to 2000. Prof. Martin Rodbell (Nobel Prize 1994) was a visiting member of his group for two years in the early 1980s. In 2004 he became the founding Director of a new Department in the Medical Faculty, the Department of Structural Biology and Bioinformatics. Prof. Offord has written, co-authored, or edited 6 books and is the author or co-author of 180 published scientific papers, mainly in various fields of protein science. He is co-inventor on several granted Patents.

Prof. Offord was one of the pioneers of the technique of protein semisynthesis. He was responsible for the first of the so-called anti-HIV "fusion inhibitors" and building on this he and his colleagues have designed and made a series of semisynthetic and synthetic proteins which are among the most powerful anti-HIV substances currently known. One of them is the first to give full protection against infection in macaques. His Geneva research group receives support from the United States National Institutes of Health for this work as an overseas applicant, as well as support from the Swiss Government.

Prof. Offord has been adviser to governments in several countries, and to international organizations. He is currently adviser to the Netherlands Government on proteomics, to the UN International Trade Centre, and a member of the Geneva government's Council for Regional Economic Development. He has been a Journal Managing Editor, member of many Editorial Boards and has consulted for many major pharmaceutical and biotechnology firms. He has been a co-founder of a number of start-ups. He was a co-founder of the Swiss Institute for Bioinformatics and is Chairman of the Advisory Board of Eclosion, Geneva's new life-sciences incubator. He shared the "Man of the Year 2002" award of the Swiss financial newspaper 'L'agefi'. He is Secretary of the American Peptide Society.

Achievement Award for Scientific and Administrative Excellence

The American peptide Society initiated this new award in 2005 to recognize and honor those who have made outstanding scientific and administrative contributions in the promotion and advancement of research in peptide science that resulted in the advancement of public health.

Rao S. Rapaka

Dr. Rao S. Rapaka was recognized for the depth of his range of scientific knowledge of the neuro-biochemistry of peptide science and his twenty-five years of continuous contributions to organizing dozens of mini-symposia, review articles, and focused journal special editions in this field.

Dr. Rapaka received his training in medicinal and peptide chemistry in the laboratories of a number of leading scientists including Professors Eugene Jorgensen (University of California) and Dan W. Urry (University of Alabama Medical Center). His research carrier started with a study of the role of stereochemical factors that influence the pressor activity of angiotensin via the synthesis and structure-activity relationships od strategically designed analog of angiotensin II. He showed the critical part that stereochemical factors played on the conformation of the peptide chain. This early success laid to the foundation for many of his other significant contributions to important peptides. For example, Dr. Rapaka demonstrated that hydroxylation was a very critical step for the stability and activities of collagen polypeptides. Upon studying analogs of the protein elastin, Dr. Rapaka demonstrated that coacervation was due to hydrophobic interactions between certain amino acid side chains. Using Fourier Transform-Infrared methods, not only he showed the β-turn and β-sheet conformations of enkephalins but he also found that ethanol abolishes these conformations for [Met^5]-enkephalinamide, thus abolishing the opiod receptor recognition for μ- and δ-receptor interaction.

The breath of his contributions is exemplified in over 100 publications and 18 research monographs. Through his long tenure at the NIH Dr. Rapaka has initiated a large number of grants and research contracts in organic syntheses and medicinal chemistry, and promoted new research areas and technologies enhancing both medicinal chemistry and drug discovery. Furthermore, Dr. Rapaka administers a National program of “Drug Supply and Related Research Services” and manages a medicinal chemistry program at NIDA. His current areas of interest are lipid maps and isolation of new bioactive endogenous lipid ligands.

Peptide Society Travel Grants

The Travel Award Committee's mission was to administer financial support for travel and housing expenses in order to provide a broad opportunity for young investigators to participate in a major scientific event, meet leaders and colleagues in the field, and present their research projects to the scientific community.

Awardees:

Kalpana Bhargara (University of North Carolina)
Damien R. Boeglin (University of Montreal)
Malene Brandt (Royal Veterinary & Agriculture University)
James P. Cain (University of Arizona)
Andrea Caporale (University of Padova)
Pradip Chakraborty (University of Gottingen)
Arvind K. Chappa (University of Kansas)
Jeffrey D. Copps (Creighton University)
Sonya Cressman (University of British Columbia)
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Marcus A. Etienne (Louisiana State University)
Wei-Jie Fang (University of Kansas)
Fabrice Galaud (University of Montreal)
Sharon Gilead (Tel Aviv University)
Krisztina Heredi-Szabo (Creighton University)
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Remco Merkx (Utrecht University)
Christopher M. Micklitsch (University of Delaware)
Byoung J. Min (University of Arizona)
Barbara Mulinacci (University of Florence)
Michael C. Owen (Creighton University)
Ilaria Paoloini (University of Florence)
Angela Peck (University of Kansas)
Ravil R. Petrov (University of Arizona)
Magdalena J. Przydzial (University of Michigan)
Beili Quan (Indiana University at Bloomington)
Karthikan Rajagopal (University of Delaware)
Soumendra Rana (Indian Institute of Technology, Bombay)
Cesar Manuel Remuzgo Ruiz (University of Sao Paulo)
Rebecca A. Roof (University of Michigan)

Deborah M. Rothman (Massachusetts Institute of Technology)
Ronak Rughani (University of Delaware)
Giuseppina Sabatino (University of Florence)
Lillian Sando (University of Queensland)
Rajesh Sankaranarayanan (University of Arizona)
Yu Tian (Center of Advanced Biotechnology & Medicine)
Aleksandar Todorovic (University of Florida)
Simona Tomaselli (University of Naples Federico II)
Isabelle van den Eynde (Vrije Universiteit Brussel)
Karolien van Rompaey (Vrije Universiteit Brussel)
Dirk-Jan van Zoelen (Utrecht University)
Miquel Vila-Perello (Universitat Pompev Fabra)
Aude Violette (CNRS – IBMC, Strasbourg)
Xin Wang (University of Kansas)
Jia Wang (Louisiana State University)
John K. Whitehead (Louisiana State University)
Ekaphol Wooden (University of Arizona)
Weiming Xu (Rutgers University)
Tatyana V. Yakovlev (University of Kansas)
Hailin Zheng (Weizmann Institute of Science)

Bert Schram Young Investigators' Mini-Symposium

The Bert Schram Young Investigator Mini-Symposium was the opening session of the meeting and as in previous years was generously supported by ESCOM Science Foundation. The session was chaired by John Mayer (Eli Lilly) and Alain Fournier (University of Quebec).

We were fortunate to have an excellent selection of graduate students as well as postdoctoral fellows from the world-wide peptide community. In the spirit of the symposium the speakers were chosen to reflect the diverse scientific disciplines within the peptide community. First Place was awarded to Matthew Hartmann (Massachusetts General Hospital/Harvard Medical School), Second Place (a tie) to Deborah Rothman (MIT) and Florence Brunel (Scripps Research Institute) and Honorable Mention to Barbara Mulinacci (University of Florence). We wish all participants continued success in their careers.

Participants

John Blankenship (University of Montreal)
Florence Brunel (The Scripps Research Institute)
Jaimes Cain (University of Arizona)
Luis J. Cruz (University of Barcelona)
Christina Foerg (Swiss Federal Institute of Technology Zurich)
Evgenia Glukhov (Hospital of Sick Children Toronto)
Matthew Hartmann (Massachusetts General Hospital/Harvard Medical School)
Remco Merkx (Utrecht University)
Barbara Mulinacci (University of Florence)
Beili Quan (Indiana University)
Karthikan Rajagopal (University of Delaware)
Deborah Rothman (Massachussetts Institute of Technology)
Miquel Vila-Perello (Universitat Pompeu Fabra)
Hope Wilson (California Alliance for Minority Participation)
David Zoeteway (University of Guelph)

Young Investigators' Poster Competition

On behalf of the Student Affairs Committee, we would like to thank all the people involved with the Young Investigator Poster Competition held at the 19th American Peptide Symposium. This year's Young Investigator Poster Competition featured over 60 poster presentations. We would like to send a special thank you to our sponsor, CS Bio, the volunteer judges, and the Symposium organizing committee for the 19th APS. Thank you to all the students and post-doctoral associates for their participation and for their excellent presentations to make this event a success. On behalf of the American Peptide Society, Congratulations to all of our winners!

Award Winners

First Place:
Melissa Shults (Massassuchetts Institute of Technology - B. Imperiali)

Second Place:
Dirk-Jan van Zoelen (Utrecht Institute for Pharmaceutical Sciences - R.M.J. Liskamp)

Third Place:
Brian Lohse (Riso National Laboratory - R. Berg)
Justin Murray (University of Wisconsin - S. Gellman)
Ronak Rughani (University of Delaware - J. Schneider)

Honorable Mention:
Pradip Chakraborty (Institute for Organic and Biomolecular Chemistry - U. Diederichsen)
Marcus Lynch (Ohio State University - Pravin Kaumaya)
Hinke Malda (Eindhoven Univeristy of Technology - T. Hackeng)
Christopher Micklitsch (University of Delaware - J. Schneider)
Audrey Kelleman (University of California San Diego - M. Goodman and M.S. Van-Nieuwenhze)
Michael Owen (Creighton University Medical Center – S. Lovas)
Krista Wilson (University of Florida- C. Haskell-Luevano)

We give a BIG thank you to over 30 volunteer judges for the mini-symposium and poster competition who generously donated their time and expertise during the competition.

Judges:

Jungmo Ahn	Robert P. Hammer	Maria Kempe
Michael Carrasco	Jie Han	Michal Lebl
Ralph Casale	Deborah L. Heyl-	William Lubell
Krys Darlak	Clegg	Claudio Mapelli
Jesse Dong	Thomas Hoeg-Jensen	John McMurray
Alain Fournier	Ryan Holder	Hisakazu Mihara
Paolo Grieco	Pravin T.P. Kaumaya	Yuji Nishiuchi

Laszlo Otvos
Annamaria Papini
David Perrin
Christian Renner
Paolo Rovero
Mark Spaller
Kripa Srivastava
Wilfred van der Donk
Sandy Vigil Cruz
Cody, Wayne
Liang Zeng Yan

Abbreviations

μ	hydrophobic moment
[θ]	mean residue ellipticity
A	active site
ααAAs	$C^{\alpha,\alpha}$-disubstituted amino acids
aa	amino acid
AAA	amino acid analysis
Aad	α-aminohexanedioic acid
AAH	amphiphilic α-helix
Aβ	amyloid β-protein; amyloid β-peptide
Ab7	2-amino-7-bromoheptanoic acid
Aba	4-amino-1,2,4,5-tetrahydro-2-benzazepine-3-one
Abc	4'-aminomethyl-2,2'-bipyridine-4-carboxylic acid
ABP	arterial blood pressure
ABPP	activity-based protein profiling
Abu	α-amino-*n*-butyric acid
Abz	o-aminobenzoyl
AC	adenylyl cyclase
Ac	acetyl; acyl
Aca	adamantanecarboxyl-; ε-amino acaproic acid
ACAB	4,4'-azobenzene-dicarboxylic acid-(4-iodo-but-2-ynyl)-bis-amide
ACC	adrenocortical carcinoma; 7-amino-4-carbamoylmethylcoumarin
Ac5c	1-aminocyclopentane carboxylic acid
Ac_nc	1-aminocycloalkane-1-carboxylic acid
ACE	angiotensin-converting enzyme
Ach	1-amino-1-cyclohexane carboxylic acid
Acm	acetamidomethyl
ACN	acetonitrile
ACP	acyl carrier protein
Acpc	1-aminocyclopropane-1-carboxylic acid
ACTH	adrenocorticotropin; adrenocorticotropic hormone
AD	Alzheimer's disease
Ad	adenovirus
Adc	10-aminodecanoic acid
ADCC	antibody dependent cell-mediated cytotoxicity
ADNP	activity-dependent neuroprotective protein
Ae9	2-amino-9-alkenoic acid
AEM	affinity enhancing motifs
Aens	2-amino-(n-1)-alkenoic acids
AFM	atomic force microscopy
Agl	aminoglycine
AGRP	Agouti-related protein
AHL	N-acylhomoserine lactone
Aib	α-aminoisobutyric acid
AIDS	aquired immune deficiency syndrome
Alloc	allyloxycarbonyl
AMBER	assisted model building and energy refinement
AMC	amino-4-methyl coumarin
AMPs	antimicrobial peptides
AMPB	(4-aminomethyl)phenylazobenzoic acid
AMPP	[3-(3-aminomethyl-phenylazo)-phenyl]-acetic acid
AN	electron acceptor
Ang	angiotensin
Ang II	angiotensin II
ANPP	4-anilino-*N*-phenethyl-piperidine
AnV	Annexin-A5
Aoe	2-amino-8-oxo-9,10-epoxy decanoic acid
APB	(4-amino)phenylazobenzoic acid
APC	antigen presenting cell
4Aph	4-aminophenylalanine
Apo A-I	apolipoprotein A-I
ApoCaM	Ca-free calmodulin
APP	amyloid β-precursor protein
APX	ascorbate peroxidase
Aq.	aqueous
AR	anomalous reflection
Ar	aromatic residue
ARDS	acute respiratory distress syndrome
Asu	2-amino suberic acid
ASP	agouti signal protein
AT_1	Ang II receptor
aTc	anhydrotetracycline
ATCC	American Type Culture Collection
ATL	adult T-cell leukemia
Atmp	4-amino-2,2,6,6-tetramethylpiperidine
ATP	adenosine triphosphate
ATR-IR	attenuated total reflection infra red spectroscopy
AUC	area under the curve
AVP	arginine vasopressin
BAL	backbone amide linker
BBB	blood brain barrier
Bbs	4-tert-butyl-benzenesulfonyl
BD	healthy blood donor serum; blood donors

BEMP	2-tert-butylimino-2-diethylamino-1,3-dimethyl perhydro-1,3,2-diaza phosphorine
BHI	brain heart infusion
BHQ	Black Hole Quencher
BIA	biospecific interaction analysis
Biot	biotinyl
Bip	biphenylalanine, 4-phenyl-phenylalanine; β-(4-biphenylyl)alanine
BK	bradykinin
BNP	brain natriuretic peptide
Boc; *t*Boc	*tert*-butyloxycarbonyl
Bom	benzyloxymethyl
BOP	(benzotriazol-1-yloxy)-tris(dimethylamino)phosphoniu m hexafluorophosphate; benzotriazolyiloxy-hexamethyl phosphoramide
Bpa	*p*-benzoylphenylalanine
BSA	bovine serum albumin
BTC	bis(trichloromethyl)carbonate
BTX	batrachotoxin
tBu	t-butyl
Bz	benzoyl
Bzl	benzyl

CaM	calmodulin
CAMM	computer assisted molecular modeling
cAMP	cyclic adenosine-3',5'-monophosphate
CAMs	constitutively active mutants
CAR	coxackie-adenovirus receptor
CBD	chitin binding domain
Cbm	carbamoyl
Cbz	carbobenzoxy; benzyloxycarbonyl
CCK	cyclic cystine knot; cholecystokinin
CCR	CC chemokine receptor
CD	circular dichroism; cinchonidine
c3diPhe	1-amino-c-2,t-3-diphenylcyclo propane-r-1-carboxylic acid
CD_3OH	methan-d_3-ol
CE	capillary electrophoresis
CecB2	cecropin B2
CF	5(6)-carboxyfluorescein
CFDA	carboxyfluorescein diacetate
cfu	colony forming units
CGRP	calcitonin gene related peptide
Cha	cyclohexylalanine
Chg	α-cyclohexylglycine
CHL	cholesterol
CHO	Chinese hamster ovary
CHROBA	chromism-based assay
cHx	cyclohexyl
Cit	2-amino-5-ureido-n-valeric acid
CLEAR	cross-linked ethoxylate acrylate resin
CLL	chronic lymphocytic leukemia
CM	chloroform-methanol
CN	cinchonine
CNBr	cyanogen bromide
CNS	central nervous system
Col	collagen
COSY	correlated spectroscopy
CoV	coronavirus
CPDs	cyclobutane pyrimidine dimers
CpG	α-cyclopentylglycine
CPP	cell penetrating peptide
cPPL	crude porcine pancreatic lipase
CPWR	coupled plasmon waveguide resonance
CRDs	cysteine-rich domains
CRPs	collagen-related peptides
CsA	Cyclosporin A
CSD	chemical shift deviation
CSI	chemical shift indice; chemical shift index
CSPG	chondroitin sulfate proteoglycan
CTC	chlorotrityl chloride
CTF	C-terminal fragment
CTL	cytotoxic T-lymphocyte
CVFF	consistent valence force field

2**D**	two dimensional
3D	three dimensional
DA	dopaminergic
Da	Dalton
Dab	2,4-diaminobutyric acid
Dabcyl	(4-[4-(dimethylamino) phenylazo]benzoyl
DAMGO	(D-Ala2, MePhe4, Gly-ol5)enkephalin; H-Tyr-D-Ala-Gly-NMePhe-Gly-ol
Dap; DAP	2,3-diaminopropionic acid
DAPI	4',6-diamidino-2-phenylindole
DAS	diaminosuberic acid
Dbzg	dibenzyl glycine
DBU	1,8-diazabicyclo[5.4.0]-undec-7-ene
DCC	N,N'-dicyclohexylcarbodiimide
DCM	dichloromethane
Dde	1-(4,4-dimethyl-2,6-dioxocyclohexylidene)ethyl
DDI	DNA-directed immobilization
DEA	diethylamine
DEAD	diethyl azodicarboxylate
Deg	diethylglycine
deINT-P1R	P1R lacking EC
DFO	desferal
DhHP	deuteroheamin-His-peptides
Dhp	3-(2,6-dimethyl-4-hydroxyphenyl)-propanoic acid

DIAD	diisopropyl azodicarboxylate
Dibal-H	diisobutylaluminium hydride
Dibg	diisobutylglycine
DIC, DIPCDI	N,N'-diisopropy1carbodiimide
DIEA, DIPEA	*N,N*-diisopropylethylamine
DKP	2,5-diketopiperazine
DLS	dynamic light scattering
DM	dodecyl maltoside
Dmab	4{N-[1-(4,4-dimethyl-2,6-dioxo-cyclohexylidene)-3-methylbutyl]-amino}benzyl
DMAP	N,N-dimethylaminopyridine
DMB	2,4-dimethoxybenzyl
DME	dimethoxyethane, glyme
DMEM	Dulbecco's modified Eagle's medium
DMF	*N,N*-dimethylformamide
Dmmb	2-mercapto-4.5-dimethoxy benzyl
DMP	Dess-Martin periodinane
dmpa	dimethoxyphenylacetyl
DMPC	1,2-dimyristoyl-*sn*-glycero-3-phosphocholine; dimyristoyl phosphatidylcholine
DMPG	1,2-dimyristoyl-*sn*-glycero-3-[phospho-rac-(1-glycerol)]; dimyristoyl phosphatidylglycerol
DMS	dimethyl sulfide
DMSO	dimethyl sulfoxide
DMT, Dmt	2',6'-dimethyltyrosine
DMT-MM	4-(4,6-dimethoxy-1,3,5-triazin-2-yl)-4-methylmorpholinium chloride
DN	electron donor
DNA	dezoxyribonucleic acid
Dnp, DNP	2,4-dinitrophenyl
DOPC	dioleoyl-DL-3-phosphati dylcholine
DOR	δ-opioid receptor
DOTA	1,4,7,10-tetraazacyclododecane-N,N',N",N"'-tetraacetic acid
DPDPE	cyclo[D-Pen2,D-Pen5]enkephalin
DPH	phenytoin
DPhPC	diphytanoyl phosphatidylcholine
DPLCE	DPen2, Cys4 enkephalin
DPPA	diphenylphosphoryl azide
DPPC	1,2-dipalmitoyl-*sn*-glycero-3-phosphatidylcholine
DPPG	dipalmitoyl-phosphatidylglycerol
DPPIV	dipeptidyl amino peptidase IV
DPPS	dipalmitoyl phosphatidylserine
Dpr	diaminopropionic acid
DQF-COSY	double-quantum filtered-correlated spectroscopy
DSC	differential scanning calorimetry; N,N-disuccinimidyl carbonate
DSLET	H-Tyr-D-Ser-Gly-Phe-Leu-Thr-OH
DTNP	2,2 dithiobis(5-nitropyridine)
DTPA	N,N-bis[2-[bis(carboxy-ethyl)amino]ethyl]; diethylene triaminepentaacetic acid
Dts	dithiasuccinoyl
DTT	dithiothreitol
Dyn	dynorphin

E

E	exosite
EADI	(*E*)-alkene dipeptide isostere
EC	N-terminal extracellular domain
EC_{50}	50% effective concentration
ECD	extracellular domain; electronic circular dichroism
ED_{50}	median effective dose
Eda	ethylenediamine; enediyne amino acid
Edans;EDANS	5-[(2'-aminoethyl)amino] naphthalenesulfonic acid
EDC	1-(3-dimethylaminopropyl)-3-ethyl carbodiimide hydrochloride
EDL	extensor digitorum longus
EDT	1,2-ethanedithiol
EDTA	ethylenediamine-tetraacetic acid
ee	enantiomeric excesses
EGF	epidermal growth factor
EGFP	enhanced green fluorescent protein
EGFR	EGF receptor
ELISA	enzyme linked immunosorbance assay
EM	electron microscopy
EMSA	electrophoretic mobility shift assays
eNOS	endothelial nitric oxide synthase
Env	envelope glycoprotein
Eoc	ethoxycarbonyl
ePC	egg yolk phosphatidylcholine
EPL	expressed protein ligation
EPO	erythropoietin
EPR	electron paramagnetic resonance
eq	equivalent
ES	electrospray
ES-MS	electrospray mass spectrometry
ESI	electrospray ionization
ESI-MS	electrospray ionization mass spectrometry
ESR	electron spin resonance
ET3N	triethylamine

EtOH	ethanol
EtSH	ethyl sulfide
F5c	2,3,4,5,6-pentafluorocinnamoyl
FACS	fluorescence-activated cell sorting
FAD	familial Alzheimer's disease
FAF	familial amyloidosis-Finnish type
FAM	carboxyfluorescein
FBS	fetal bovine serum
FGF	fibroblast growth factor
FIB	focused ion beam
FITC	fluorescein isothiocyanate
FKBP	FK506 binding protein
Flu	fluorescyl 5-carboxyl
Fmc	fluorenyl-9-methylcarbonyl
fMLP	formyl-Met-Leu-Phe
Fmoc	9-fluorenylmethoxycarbonyl
FN	fibronectin
Fol	1,2 aminoalcohol phenylalaninol
FP	fusion peptide
FPLC	Fast Performance Liquid Chromatography
FPP	farnesyl diphosphate
FPR	formyl peptide receptor
FRB	FKBP–rapamycin binding domain
FRET	fluorescence resonance energy transfer
Fsa	furanoid sugar aminoacid
FTICR	Fourier-transform ion cyclotron resonance
FTIR	Fourier transform infrared
gA	gramicidin; gramicidin A
GA	gibberellin
Gal	galactose
GAS	group A streptococcal
gB	glycoprotein B
Gd(III)DTPA	gadolinium(III) diethylenetriamine pentaacetic acid
GdnHCl	guanidinium hydrochloride
GFC	gel filtration chromatography
GFP	green fluorescent protein
GGPP	geranylgeranyl diphosphate
GH	growth hormone
GHRP	growth hormone-releasing peptide
GHS	growth hormone secretagogue
GI	gastro-intestinal
GIF	growth inhibition factor
GlcNAc	*N*-acetylgalactosamine
gln II	glutamine synthetase II
GLP-1	glucagon-like peptide 1
Gm	gomesin
GnRH	gonadotropin-releasing hormone
GPCR	G-protein-coupled receptor
GPC	gel permeation chromatography
GPI	guinea pig ileum
Grb2	growth factor receptor-bound protein 2
GRF	growth hormone releasing factor
GRPs	glycine-rich proteins
GSH	reduced glutathione
GSSG	oxidized glutathione
GSTI	glutamine synthetase translational inhibitor
GTP	guanosine triphosphate
GTT	glucose tolerance test
HA	hemagglutinin
HABA	4'-hydroxyazobenzene-2-carboxylic acid
HAP	histo-aspartic protease
HAT	histone acetyl transferase
hAT1	human angiotensin II type 1
HATU	*N*-[(dimethylamino)-1*H*-1,2,3-triazolo[4,5-*b*]pyridin-1-yl-methylene]-*N*-methyl methanaminium hexafluoro phosphate *N*-oxide
Hb	hemoglobin
HBTU	*O*-benzotriazolyl-*N,N,N',N'*-tetramethyluronium hexafluoro phosphate; N-[1H-benzotiazol-1-yl-(dimethylamino)methylene]-N-methylmethanminium nexafluoro phosphate-N-oxide
HBV	hepatitis B virus
HCV	hepatitis C virus
Hcy	homocysteine
HDAC	histone deacetylase
HDL	high-density lipoprotein
HDX	hydrogen/deuterium exchange
HE	high exhaustion
HEK	human embryonic kidney
HER	human epidermal growth factor receptor
HF	hydrogen fluoride
HFA	hexafluoroacetone
HFIP	hexafluoroisopropanol
HG	human gastrin
HGP	hairless guinea pig
HI	human insulin
hIAPP	human islet amyloid polypeptide
HIF-1α	hypoxia inducible factor 1α
hIL-8	human interleukin 8
HIV	human immunodeficiency virus
HIP	heparin interacting protein
HLA	human leukocyte antigen

Hmb	N-(2hydroxy-4-methoxy)
HMBA	4-hydroxymethylbenzoic acid resin
HMC	hydroxymethylcarbonyl
hMCR	human melanocortin receptor
HMEC	human mammary epithelial cells
HmSer	α-hydroxymethylserine
HAM/TSP	HTLV-1 associated myelopathy/tropical spastic paraparesis
HmVal	α-hydroxymethylvaline
HN	humanin
HNE	4-hydroxy-trans-2,3-nonenal
^{1}H-NMR	proton nuclear magnetic resonance
HOAt	1-hydroxy-7-azabenzotriazole
HOBt	1-hydroxybenzotriazole
HONB	N-hydroxy-5-norbornene-2,3-dicarboximide
HOObt	3,4-dihydro-3-hydroxy-4-oxo-1,2,3-benzotriazine
HoPhe	homophenylalanine
Hor	hydroorotyl
HOSu	N-hydroxysuccinimide
HP	hot plate
Hpi	3a-hydroxy-pyrrolo[2,3-b]indole
HPLC	high performance liquid chromatography
HPMVEC	human pulmonary microvascular endothelial
hPrP	human prion protein
Hpt	haptoglobin
hPTH	human parathyroid hormone
HPV	human papilloma virus
Hpx	hemopexin-like
HR	heptad repeat; hydrophobic repeat
HR-MAS	high resolution-magic angle spinning
HRMS	high resolution mass spectroscopy
Hse	homoserine
HSQC	heteronuclear single-quantum coherence/correlation
HSV-1	herpes simplex virus type I
HTLV-1	human T-cell lymphotropic/ leukemia virus type 1
HTS	high-throughput screening
hUCP-1	human uncoupling protein 1
HUVEC	human umbilical vein endothelial cells
Hva	homoveratryl
Hvn	homovanillyl
hV1bR	human vasopressin pituitary receptor
hV2R	human vasopressin kidney receptor
Hyl	5-hydroxylysine
Hyp	hydroxyproline; trans-4-hydroxyproline

IAmp	4-(N-isopropyl)-aminomethylphenylalanine
IBMX	3-isobutyl-1-methylxanthine
IC_{50}	50% inhibition concentration
i.c.v.	intracerebroventricular
Idp	3-isopropyl-3-(2,6-dimethyl-4-hydroxyphenyl)propanoic acid
IEX	ion exchange chromatography
IFN	interferon
Ig	immunoglobulin
IGF	insulin-like growth factor
Igl	α-(2-indanyl)glycine
IL	interleukin
Im	immunity protein
IMPACT	intein-mediated purification with an affinity chitin-binding tag
IN	HIV-1 integrase
Ind	indoline-2-carboxylic acid
Indo	indomethacin
iNOS	inducible nitric oxide synthetase
Inp	isonipecotic acid
i.p.	intraperitoneal
IP	inositol phosphate
IPA	isopropyl alcohol
iPrOH	isopropanol
IPTG	isopropyl-β-D-thiogalactopyranoside
IQFS	internally quenched fluorogenic substrate
IR	infrared spectroscopy; insulin receptor
I/R	ischemia/reperfusion
ITC	isothermal titration calorimetry
i.v.	intravenous
ivDde	1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)-3-methylbutyl

Ka	association equilibrium constant
Kd	dissociation equilibrium constant
KLH	keyhole limpet hemocyanin
KOR	kappa opioid receptors; Kaiser resin

Laa	lipoaminoacid
LAC	β-lactamase
LAH	lithium aluminum hydride
LB	Luria-Bertani
LC	lung cancer
LCAT	lecithin-cholesterol acyltransferase

LC/ESI-MS	liquid chromatography/electrospray ionization mass spectrometry
LCFA	long chain fatty acids
LC-MS, LC/MS/MS	liquid chromatograph/tandem mass spectrometry
LCP	lipidic core peptide; lipid core peptide
LDA	lithium diisopropylamide
ldp	3-isopropyl-3-(2,6-dimethyl-4-hydroxyphenyl)propanoic acid
LDL	low density lipoprotein
LDMS	laser desorption mass spectroscopy
LH	luteinizing hormone
LIF	laser induced fluorescence detection
LINCL	late-infantile neuronal ceroid lipofuscinosis
LMMP	longitudinal muscle with myenteric plexus
LMP	low melting point
Lol	leucinol
LPO	lipid peroxidation
LPS	lipopolysaccharide
LVDP	left ventricular developed pressure
LVP	lysine vasopressin
mAb	monoclonal antibody
MALDI	matrix-assisted laser desorption/ionization
MALDI-TOF	matrix-assisted laser desorption/ionization time-of-flight
MAP	multiple antigen peptide
MAPS	microwave assisted peptide synthesis
MAPK	mitogen-activated protein kinase
Mapoc	4-dimethylaminophenacyloxy-carbonyl
MaUCP-1	golden hamster UCP-1
MBC	minimal bactericidal concentration
MBHA	*p*-methylbenzhydrylamine
MBP	maltose binding protein; myelin basic protein
Mca	(7-methoxycoumarin-4-yl)acetyl
MCP-1	monocyte chemoattractant protein 1
mCPBA	3-chloroperbenzoic acid
MC	melanocortin; microencapsulated
MCR	melanocortin receptor
MD	molecular dynamics
MDA	malondialdehyde
Mdm2	murine double minute 2
Mdp	C^{α}-methyl DOPA; 3-methyl-3-(2,6-dimethyl-4-hydroxyphenyl)-propanoic acid
ME	2-mercaptoethanol
Me	methyl
MeCN	acetonitrile
MeOH	methanol
Mesna	mercaptoethanesulfonic acid
MFS	major facilitator superfamily
MHC	major histocompatibility complex
MHS	6-maleimidohexanoic acid N-hydroxysuccinimide ester
MIC	minimum inhibitory concentration
MIP-1	macrophage inflammatory proteins 1
MM	molecular mechanics
MMP	matrix metalloproteinase
Mmt	4-methoxytrityl
Mnpe	N-2-mercapto-1-(2-nitrophenyl)ethyl
MO	molecular orbital
Mob	4-methoxybenzyl
MOG	myelin oligodendrocyte glycoprotein
MOR	mu opioid receptors
MP	mastoparan
MPA	methionine proximity assay
MPER	membrane-proximal external region
MR	magnetic resonance
MRI	magnetic resonance imaging
MRSA	methicillin-resistant *Staphylococcus aureus*
MS	mass spectrometry; multiple sclerosis
MSA	methanesulfonic acid
Msc	β-methylsulfonyl ethoxycarbonyl
MsCl	methanesulfonyl chloride
MSH	melanocyte stimulating hormone; melanotropin
MSNT	2,4,6-mesitylene-sulfonyl-3-nitro-1,2,4-triazolide
MTBD	7-Methyl-1,5,7-triazabicyclo-[4.4.0]dec-5-ene
MTII	Ac-Nle-c[Asp-His-D-Phe-Arg-Trp-Lys]-NH_2
Mtt	4-methyltrityl
MTT	3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide
MVD	mouse vas deferens
MVF	measles virus fusion protein
MW	molecular weigth
MW-SPPS	microwave-assisted solid-phase peptide synthesis
Myr	myristoyl

NA	neuraminidase
$NABH(OAc)_3$	sodium triacetoxyborohydride
NADPH	nicotinamide adeninedinucleotide phosphate,reduced form
Nal	naphthylalanine
D-Nal-2	D-3-(2-naphtyl)alanine
NBA	nucleobase amino acid
NBS	*N*-bromosuccinimide
NC	nociceptin; nucleocapsid
NCL	native chemical ligation
NE	norepi-nephrinergic
N-ECD	N-terminal extracellular domain
NEP	nephrilysin
NET	norepinephrine transporter
NFAT	nuclear factor of activated T-cell
NHMe	N-methylamide
NHS	N-hydroxysuccinimide
Nif	niflumic acid
NIR-FT	near-infrared, Fourier-transform
NIR-FT-Raman	Near Infrared Fourier Transformed Raman spectroscopy
NK-R	neurokinin receptor
Nle	norleucine
Nleu	N-isobutyl glycine
NLS	nuclear localization signal
Nma	2-(N-methylamino)benzoyl; N-methylanthranyl, N-methylalanine
NMM	*N*-methylmorpholine; N-methyl morpholamine
NMP	*N*-methylpyrrolidinone
NMR	nuclear magnetic resonance
NO	nitric oxide
nOct	*n*-octanoyl
NOE	nuclear overhauser effect; nuclear overhauser enhancement
NOESY	nuclear overhauser enhanced spectroscopy
Npa	2-nitrophenylacetyl
NPN	N-phenyl-naphtylamine
NPY	neuropeptide Y
5-Npys	5-nitropyridylsulfide
Npys	5-nitro-2-pyridinesulfenyl
Ns	2-nitrobenzenesulfonyl
NSAIDs	non-steroidal anti-inflammatory drugs
NSB	non-specifically bound
Nsc	2-(4-nitrophenylsulfonyl)ethoxy-carbonyl
NT	neurotensin
NTI	naltrindol
NTS	nuclear targeting signal peptide
Nva	norvaline
OBOC	one-bead one-compound
OC2Y	O-(2,6-dichlorobenzyl)-tyrosine
OHDA	hydroxydopamine
Oic	octahydroindolyl-2-carboxylic acid
OMe	methoxy
OMPC	outer membrane protein complex
*o*NBS	*o*-nitrobenzenesulfonyl
*o*NPS	*o*-nitrophenylsulfenyl
OPfp	pentafluorophenyl ester
Orn	ornithine
Osu	N-hydroxysuccinimide ester
OT	oxytocin
OTR	oxytocin receptor
OXL	5(4H)-oxazolone
Pa	pseudomonas aeruginosa
PA	partial agonist; anthrax protective antigen
PAD	partial alloc deprotection
PAGE	polyacrylamide gel electrophoresis
Pal	(3-pyridinyl)alanine
D-3-Pal	D-3-(3-pyridyl)alanine
PAL	peptide amide linker 5-(4-Fmoc-aminomethyl-3,5-dimethoxy phenoxy)valeric acid; photoaffinity labeling
PAM	phenylacetamidomethyl resin
PAO	*p*-aminophenylarsen(III)oxide
PAP	pulmonary artery pressure
Pbf	2,2,4,6,7-pentamethyl-dihydrobenzofurane-5-sulfonyl
PBLA	poly-β-benzyl-L-aspartate
PBLG	poly-γ-benzyl-L-glutamate
PBMC	peripheral blood mononuclear cells
PBS	phosphate-buffered saline
PC	prostate cancer
PCs	proprotein convertases
PCIBLA	poly(β-p-chlorobenzyl L-aspartate)
Pcn	(E)-α-phenylcinnamoyl
PCR	polymerase chain reaction
PD	Parkinson's disease
Pd	palladium
PDGF	platelet derived growth factor
PDI	protein disulfide isomerase
PDMS	polydimethylsiloxane
PDB	protein data bank
PEG	polyethylene glycol
PEGA	polyethylene glycol polyacrylamide
PEM	protein epitope mimetics
Pen	penicillamine
PES	potential energy surface

PET	positron emision tumography
PFG	pulsed field gradient
PFGSE	pulsed-field-gradient spin-echo
Pfp	pentafluorophenyl ester
PFP	protein fingerprint
PFTase	protein farnesyltransferase
PG	protecting group
PH	pleckstrin homology
Phg	phenylglycine
PhSH	thiophenol
Pht	phthaloyl
PI	phosphatidylinositol
PICUP	photo-induced cross-linking of unmodified proteins
Pin1	protein interacting with NIMA 1
Pip	L-pipecolic acid
pip	D-pipecolic acid
PKA	cAMP-dependent kinase A
PKC	protein kinase C
Plm	plasmepsin
PMA	phorbol-12-myristate 13-acetate
Pmc	2,2,5,7,8-pentamethylchroman-6-sulfonyl
PMN	polymorphonuclear leukocyte
Pms	2-[phenyl(methyl)sulfonio] ethoxy carbonyl
pNA	*p*-nitroaniline
PNA	peptide nucleic acid
*p*NBS	*p*-nitrobenzenesulfonyl
Pns	phenylnorstatine
*p*NZ	*p*-nitrobenzyloxycarbonyl
p.o.	oral administration
POMC	proopiomelanocortin
POPC	1-palmitoyl-2-oleoyl-*sn*-glycero-3-phosphocholine
POPG	1-palmitoyl-2-oleoyl-*sn*-3-[phospho -rac-(1-glycerol)]
POPE	1-palmitoyl-2-oleoyl-*sn*-glycero-3-phospho-ethanolamine
POPNA	pyrrolidine-based oxy-peptide nucleic acid
PPLA	poly(β-phenethyl L-aspartate)
PPIase	peptidyl-prolyl isomerase
PPT	polypurine/polypirimidine tract
P1R	PTH receptor-1
PR8	A/Puerto Rico/8/34 influenza virus strain
Pra	propargylglycine
PRP	platelet rich plasma
PrP^C	cellular prion protein
ps	picosecond
PS	polystyrene; poly(styrol); phosphatidylserine
PSP	phosphoserine phosphatase
PS-SCL	positional scanning SCL
PTC	primary tumor cell; phase transfer catalysis
PTH	parathyroid hormone
PTHR	parathyroid hormone receptor
p-TsOH	p-toluenesulfonic acid
PTX	pertussis toxin
pTyr	phosphotyrosine
PVAc	polyvinylactetate
PWR	plasmon waveguide resonance
PyAOP	(7-azabenzotriazol-1-yloxy)-tris(pyrrolidino)phosphonium hexafluorophosphate
PyBOP	(benzotriazol-1-yloxy)-tris(pyrrolidino)phosphonium hexafluorophosphate
QDs	quantum dots
QCM	quartz crystal microbalance
QSAR	quantitative structure-activity relationships
RCAM	ring-closing alkyne metathesis
RCM	ring-closing metathesis; ring-closing alkene metathesis
RDC	residual dipolar coupling
rDNA	recombinant desoxynucleic acid
Rg	radius of gyration
RGA	reporter gene assay
RGD	Arg-Gly-Asp
RI, r.i.	retro-inverso
RIS	radioimmunoscintigraphy
RIT	radioimmunoteraphy
rLys turn	reverse lysine turn
rms	root mean square
RMSD, rmsd	root mean square deviation
RNase	ribonuclease
RNAP	RNA polymerases
ROE	rotating frame nuclear Overhauser effect
ROESY	rotating frame nuclear Overhauser enhanced spectroscopy
ROMP	ring-opening metathesis
rOTR	rat oxytocin receptor
RP	reversed-phase
RP-HPLC	reversed-phase HPLC
rt/RT	room temperature
RT-PCR	reverse transciptase-polymerase chain reaction
RU	resonance units
rUT	rat urotensin receptor
rV1aR	rat vasopressin vasopressor receptor
rV1bR	rat vasopressin pituitary receptor
rV2R	rat vasopressin kidney receptor
SA	simulated annealing
SAR	structure activity relationship
SARS	severe acute respiratory syndrome

SARS-CoV	SARS coronavirus
Sc, sc, s.c.	subcutaneous
SCAM	substituted cysteine accessibility method
Sce	Saccharomyces cerevisiae
SCLC	small cell lung cancer
SCLs	synthetic combinatorial libraries
SD	standard deviation; substitution degrees
SDF-1	stromal-derived cell growth factor 1
SDS	sodium dodecyl sulfate
SEC	size exclusion chromatography
Sec	selenocysteine
SEER	sequence-enabled reassembly
SEM	scanning electron microscopy
SFTI	sunflower trypsin inhibitor
SH	src homology domain
SHU 9119	Ac-Nle-c[Asp-His-D-Nal(2')-Arg-Trp-Lys]-NH_2
SICLOPPS	split intein circular ligation of peptides and proteins
siRNA	small interfering RNA
SM	sphingomyelin
SO	superoxide
SOD	superoxide dismutase
SP	substance P
SPA	scintillation proximity assay
SPECT	single photon emission computed tomography
SPPS	solid-phase peptide synthesis
SPR	surface plasmon resonance
SPS	solid phase synthesis
Sps	2-(4-sulfophenylsulfonyl)-ethoxycarbonyl
Stat3	signal transduction and activator of transcription 3
STD-NMR	saturation transfer difference NMR
Ste2p	α factor pheromone receptor
STM	short transmembrane segment; scanning tunnelling microscopy
STMs	signal transduction modulators
SUIM	suberimidyl
Suc	succinyl
SV40	simian virus 40
Tα1	thymosin α1
TAC	triazacyclophane
T-ag	tumor antigen
TAPP	H-Tyr-D-Ala-Phe-Phe-NH_2
TASP	template-assembled synthetic protein(s)
TAT	transactivating transcriptional activator
TBAF	tetra-*n*-butylammonium fluoride
Tbc	tetrahydro-β-carboline
TBDMS	*tert*-butyldimethylsilyl
TBDMSCl	*tert*-butyldimethylsilylchloride
TBS	*t*-butyldimethylsilyl
TBTU	2-(1H-benzotriazol-yl)-1,1,3,3-tetramethyluronium tetrafluoroborate
*t*Bu	*tert*-butyl
TCE	tetrachloroethane
TCEP	tris(carboxyethyl)phosphine
Tcp	tetrachlorophthaloyl
TCP	trityl chloride polystyrene
TCR	T cell receptor
TD	tetramerization domain
TEA	triethylamine
TEM	transmission electron microscopy
TES	triethylsilane
TF	tail-flick
TFA	trifluoroacetic acid
Tfa	trifluoroacetyl
TFE	trifluoroethanol
TFMSA	trifluoromethanesulfonic acid
TfOH	triflic acid
Tft	4,4,4-trifluorothreonine
TG	tentagel
THF	tetrahydrofuran
Thi	β-(2-thienyl)-alanine
THP	triple-helical peptide; tetrahydropyranyl
ThT	thioflavin T
Thz	thiazolidine-4-carboxylic acid; thiazolidyl
Tic	1,2,3,4-tetrahydroisoquinoline-3-carboxylic acid
TIPS; TIS	triisopropyl silane
TLC	thin layer chromatography
TM	transmembrane, transmembrane helix
TM, TMD	transmembrane domain; transmembrane helix
TMA	trimesic acid; tissue microarray
Tmob	2,4,6-trimethoxybenzyl
TMR	tetramethylrhodamine
TMS	trimethylsilyl
TMSBr	trimethylsilylbromide
TMSOTf	trimethylsilyloxy trifluoromethanesulfonate
TMT	β-methyl-2',6'-dimethyltyrosine
TNF	tumor necrosis factor
TNTU	2-(5-norbornene-2,3-dicarboximido)-1,1,3,3-tetramethyluronium tetrafluoroborate
TOAC,Toac	2,2,6,6-tetramethylpiperidine-1-oxyl-4-amino-4-carboxylic acid
TOCSY	total correlation spectroscopy
Tos	tosyl
TP5	thymopentin
TPP I	tripeptidyl-peptidase I

Tris	tris(hydroxymethyl) aminomethane
Trt	trityl
Tsoc	triisopropylsilyloxy
U69,593	(5α,7α,8β)-(-)-N-methyl-N-[7-(1-pyrrolidinyl)-1-oxaspiro [4.5]dec-8-yl] benzeneacetamide
U-II	urotensin-II
UCP	uncoupling proteins
UDP-GlcNAc	uridine diphosphate N-acetyl glucosamine
USDA	United States Deprtment of Agriculture
UT	urotensin II receptor
UTI	urinary tract infection
UV	ultraviolet spectroscopy
UVR	ultraviolet radiation
UV-Vis	ultraviolet-visible spectroscopy
V1a-R	V1a receptor
V1aR	vasopressin vasopressor receptor
V1bR	vasopressin pituitary receptor
VCD	vibrational circular dichroism
VDAC	voltage dependent anion-selective channel
VEGF	vascular endothelial growth factor
VesCPs	*Vespa* chemotactic peptides
VIP	vasoactive intestinal peptide
VLDL	very low density lipoprotein
VMA	vacuolar membrane ATPase
vMIP-II	viral macrophage inflammatory protein II
VP	vasopressin
∇Phe	2,3-cyclopropyl phenylalanine
V2R	vasopressin kidney receptor
VRE	vancomycin-resistant enterococci
vWF	Willebrand factor
Wang	p-benzyloxubenzyl alcohol resin
WGA	wheat germ agglutinin
WSCD	water-soluble carbodiimide
WT	wild type
Xaa, Xxx	any amino acid
Z	benzyloxycarbonyl; pyroglutamic acid
ZF	zinc finger

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