CURRICULUM VITAE

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Education

1960 BA University of California, Los Angeles, CA. Zoology
1962 MA University of California, Los Angeles, CA. General Physiology
1966 PhD University of California, Los Angeles, CA. Cell Physiology/Biochemistry

Employment History

1960-1962 Teaching and Research Assistants, Department of Zoology, UCLA, Los Angeles, CA. OH Scherbaum, mentor

1966-1968 Postdoctoral Fellow, Microbiology Institute, University of Copenhagen, Copenhagen, Denmark. NO Kjeldgård, sponsor

1968-1973 Assistant Professor, Department of Virology, Hebrew University-Hadassah Medical School, Jerusalem, Israel. N Goldblum, Chair

1973-1975 Visiting Research Chemist, Department of Chemistry, School of Medicine, University of California, San Diego, La Jolla, CA. NO Kaplan, sponsor

1975-1977 Senior Research Associate, Neuroendocrinology Laboratory, Salk Institute, La Jolla, CA. R Guillemin (Nobel Laureate, Medicine, 1977)

1977-date Research Chemist, National Institute of Environmental Health Sciences, Research Triangle Park, NC. Current Position: Head, Medicinal Chemistry Group, Laboratory of Pharmacology. D. Miller, Acting Chief.

1978-date Adjunct, Department of Pharmacology, School of Medicine, University of North Carolina, Chapel Hill, NC
1978-date Adjunct, Lineberger Cancer Research Institute, University of North Carolina, Chapel Hill, NC

Society Membership

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

Honors, Special Recognition, Committees

1956 Bausch & Lomb Honorary Science Award.
1956 Rotary Club of America Design Award
1956 Southern California Science Fair Award
1973 Friends of Hadassah Science Award
1991-1994 Animal Care and Use Committee
1995 Graphics and Photography Focus Group
1995-date Structural Biology Faculty
1995-date Neuroscience Faculty
1996 Outstanding Performance Award
1998 Supply Advisory Committee
1999 Outstanding Performance Award
2000 Promotion to GS-15
2002 Special Service Award
2003 Reviewer: International Cooperative Biodiversity Groups Program (ICBG) supported by NIH, NSF and USDA, in cooperation with the Fogarty Center
2004-2007 NIEHS Committee on Promotions (COP-3)
2004-2007 TIPS Award Committee
2007 Performance Award
2008 Reviewer for the Akabori Memorial Award 2008 presented by the Japanese Peptide Society once every two years to an outstanding scientist for meritorious lifetime achievement

Grants, Fellowships

1962-1966 USPHS Training Grant in Protozoology and Parasitology, Department of Zoology, University of California, Los Angeles
1966-1968 USPHS Postdoctoral Fellowship, Microbiology Institute, University of Copenhagen, Denmark, NO Kjeldgård, sponsor
1973-1974 American Friends of the Hebrew University, Special Research Fellowship

1973-1975 USPHS Fellowship, Department of Chemistry, University of California, San Diego, NO Kaplan, sponsor

1999-2002 Grant-in-Aid for Scientific Research, (C) 11694326, Japan Society for the Promotion of Science. Title: Design and synthesis of μ-selective opioidmimetic peptides. Okada Y, Yokoi T, Tsuda Y, **Lazarus LH**, Bryant SD.

Research Interests

1960-1966 Identification, isolation, purification, characterization of RNases, acid phosphatase, phosphodiesterase from *Tetrahymena pyriformis*

1966-1968 Induction of the galactokinase operon in *E. coli*

1968-1973 Characterization, isolation of FMDV replicase; viral enzymology; RNA and DNA synthesis; isolation, characterization DNA Pol α, β

1973-1975 General ligand affinity chromatography

1975-1977 Peptide endocrinology, neurochemistry

1977-1987 Identification of bioactive peptides in mammalian tissue

1987-date Rational design of opioid drugs and biochemical, pharmacological, and physiological mode of action of ligands; computational modeling

Major Research Achievements

1964 Inhibited synchronized cell division in *Tetrahymena* by actinomycin D

1967 Discovered, isolated of three base-specific RNases from *Tetrahymena*

1968 Discovered a phosphodiesterase in *Tetrahymena*

1972 Detailed kinetics of phosphorus analysis

1973 Discovered requirement for RNA in DNA synthesis in intact nuclei

1973 Discovered polymeric nature of DNA Pol α

1973 Discovered differential heparin inhibition of DNA Pol α and β

1973 Discovered the requirement for viral ssRNA in dsRNA replication

1976 Applied general-ligand affinity chromatography to enzyme purification Quoted in Pharmacia PL-Biochemicals catalog

1976 Discovered β-LH as a precursor for endogenous opioids. Summarized in *Chemistry* **1976**, *48*, 22-24. Most cited article in endocrinology 1977

1977 Discovered neurotensin receptors in extraneural tissue (mast cells)

1980 Discovered a mammalian physalaemin-related peptide

1982 Discovered bombesin-related peptide in human lung small-cell carcinoma. Cover Story in *Oncology Today*, 1982

1983 Discovered physalaemin-related peptide in human lung small-cell carcinoma. Abstracted by the Public Affairs Office of FASEB Feature Service, 1983. Summarized in *Biomedicine et Pharmacotherapie*, 1983. Discussed in *Selecta* **1983**, *33* (XXV): 2864. Appeared as a feature article in the *Durham Morning Herald*, Sunday 30 January 1983

1983 Discovered mammalian bombesin-related peptide in milk
1985 Isolated physalaemin-related peptide from mammalian tissue
1989 Identified amphibian deltorphin as a δ-opioid receptor selective ligand
Quoted in Bachem California catalog
1989 Discovered bradykinin in bovine milk
1995 Developed potent Dmt-Tic pharmacophore (δ-opioid receptor antagonist)
1998 Awarded *U.S. Patent No. 5,780,589* for δ-opioid receptor di- and tripeptide Dmt-Tic pharmacophore antagonists
2000 Inhibited hMDR-1 by hydrophobic δ-opioid receptor antagonists
2002 Transformed δ-opioid antagonist into potent δ-opioid agonist
2003 Discovered synthetic μ-opioid pyrazinone ligands with CNS analgesia. *Patent application No. 03703014.5-2103-JP0300516*
2004 Demonstrated oral bioavailability of synthetic μ-opioid agonist
2004 Awarded *U.S. Patent No. 6,753,317* for δ-opioid receptor ligands
2004 Developed fluorescent δ-opioid antagonist.
2005 Developed Dmt-Tic dual μ-/δ-opioid receptor antagonists; interconversion between δ-antagonist and δ-agonist ligands
2006 Converted selective μ-agonist into a potent μ-antagonist
2007 Prevented morphine withdrawal symptoms by selective μ-antagonists
2007 Patent application for ^{18}F-opioids for PET screening for δ receptors in lung cancer. *Patent pending*.

Ad Hoc Reviewer

Analytical Biochemistry
Bioorganic & Medicinal Chemistry
Bioorganic & Medicinal Chemistry Letters
Canadian Journal of Biochemistry
Cancer Research
Chemico-Biological Interactions
Comparative Biochemistry and Physiology
Critical Reviews in Oncology/Hematology
Current Medicinal Chemistry
Endocrine Journal
Endocrinology
Environmental Heath Perspectives
European Journal of Cell Biology
International Foundation for Science (http://www.ifs.se)
Journal of Biological Chemistry
Journal of Endocrine Investigation
Journal of Medicinal Chemistry
Journal of Pharmacology and Experimental Therapeutics
Journal of Peptide Research

Journal of Peptide Science
Journal of the American Chemical Society
Letters in Peptide Science
Medicinal Chemistry Research
Mini-Reviews in Medicinal Chemistry
Molecular and Cellular Neuroscience
Molecular Pharmacology
Peptides
Photochemistry and Photobiology
Proceedings of the National Academy of Science, USA
Protein Science
Regulatory Peptides
Science
Society for Experimental Biology and Medicine
Trends in Biotechnology
Trends in Pharmacological Sciences

Mentorship Activities

1978-1980 Michael D. Erisman PhD, Postdoctoral Fellow, American Lung Association, University of California, San Diego.
Current position: Vice President for Research, A/F Protein, Waltham, MA 02154.

1984-1987 Antonio Guglietta MD, PhD, IRTA Fellow, Rome, Italy.
Current position: Director of Research and Development, Grupo Ferrer Internacional, S.A., Gran Via Carles III, 98, E-08028 Barcelona, Spain.

1991-1993 L Martti J Attila PhD, IRTA Fellow, Helsinki, Finland
Current position: Faculty of Veterinary Medicine, Department of Clinical Sciences, Pharmacology and Toxicology, POB 57, University of Helsinki, Helsinki, Finland FIN-00014.

1996-1998 Peter S. Cooper PhD, IRTA Fellow, University of Virginia.
Current position: National Center for Biotechnology Information, National Library of Medicine, Bethesda, MD.

2001-2006 Yunden Jinsmaa PhD, IRTA Fellow, Ulaanbaatar, Mongolia and Kyoto University, Japan.
Current position: College of Pharmacy, Division of Medicinal and Natural Products Chemistry, S328, University of Iowa, Ames, Iowa 52240

2004-present Ewa D Marczak PhD, Research Fellow. Biotechnology Laboratory of Industrial Chemistry Research Institute, Warsaw, Poland

Guest Investigators

1983-1984 Giovanni Gaudino PhD, NATO Fellow and Visiting Scientist, Fogarty International Center.
Current position: Professor, School of Pharmacy, Department of Medical Sciences, Universitá degli Studi del Piemonte Orientale *Amedao Avogadro*, 28100 Novara, Italy

1987-1988 Antonio Guglietta MD, PhD, Visiting Research Associate

1994 L Martti J Attila PhD, Consultant.

Students

1993 James Dixon BA, Summer Award Program, American Society of Biochemistry and Molecular Biology for High School Teachers

1997 Summer of Discovery Program: Jennifer Hardisty (UNC), Tara Lovekamp (NCSU)

2006 Summers of Discovery Program: Jennifer Williams (Native American, University of Oklahoma) and Jillian Fine (UNC)

2008 Summers of Discovery Program: Nicole Capik (George Mason University)

Invited Presentations

1966 Fluctuation of nuclease activity in heat-synchronized *T. pyriformis*: Carlsberg Biological Laboratories, Copenhagen, Denmark; E Zeuthen PhD, Chair and host. October, 1966.

1967 Properties of the nucleases from *T. pyriformis* and their fluctuation during synchronized growth: Department of Zoology, University of Lund, Lund, Sweden. May, 1967.

1968 Isolation of gal$^-$ lambda phage and induction of the gal operon in *E. coli* temperature-sensitive mutants: Department of Microbiology, University of Copenhagen, Copenhagen, Denmark; NO Kjeldgaard PhD, host. April, 1968.

1970 Capsid structure of foot-and-mouth disease virus: Department of Virology, Hebrew University-Hadassah Medical School, Jerusalem, Israel; N Goldblum PhD, Chair and host. October, 1970.

1973 **Special Lecturer:** International Conference on Herpes and Related Viruses, Glasgow, Scotland. Biochemical properties of foot-and-mouth disease virus RNA polymerase. 23 February 1973.

1975 NIH conference on Mammalian DNA Polymerase, Monterey, CA. Biochemical and molecular properties affecting the activity of mammalian DNA polymerase. 28-31 January 1975.

1973 Interconversion between eukaryotic polymeric DNA polymerases: Diabetes Branch, NIAMDD, NIH, Bethesda, MD; J Roth MD, host. 24 August 1973.

1973 Interconversion between eurkaryotic nuclear and cytoplasmic DNA polymerases: Department of Microbiology, University of Arizona, College of Medicine, Tucson, AZ; H Bernstein MD, host. 6 November 1973.

1973 Interconvertability among eurkaryotic polymeric DNA polymerases: Department of Biology, New Mexico State University, Las Cruces, NM; RT O'Brien PhD, host. 7 November 1973.

1973 Eurkaryotic polymeric DNA polymerases: Action of heparin and conversion into monomeric enzyme. Department of Microbiology, University of New Mexico, Albuquerque, NM; LC McLaren PhD, host. 8 November 1973.

1974 Dissociation and specific inhibition of eurkaryotic DNA polymerases: Department of Biology, California State University, Pomona, CA; L Cohen PhD, Chair and host. January 1974.

1974 Interrelationship between eukaryotic DNA polymerases: Department of Biology, California State University, Northridge, CA; M Cantor PhD and P Sheeler PhD, hosts. March 1974.

1975 Isolation of RNase free from DNase and protease contamination by general ligand affinity chromatography: Department of Chemistry, University of California San Diego, School of Medicine, La Jolla, CA; NO Kaplan PhD, host. June 1975.

1975 **Special Lecturer:** Engineering Foundation Conferences on Enzyme Engineering, Reed College, Portland, OR. Purification of dehydrogenase and kinases by affinity chromatography. 3-8 August 1975.

1976 Interaction of neurotensin with membrane receptor sites: NIEHS, Research Triangle Park, NC; RP DiAugustine PhD, host. August 1976.

1978 Specificity of the binding of neurotensin to mast cell receptor sites: Diabetes Branch, NIAMDD, NIH, Bethesda, MD; J Roth MD, host. June 1978.

1979 Evidence on the presence of [Leu^5]enkephalin precursor in a murine mastocytoma: Department of Pharmacology, University of North Carolina, School of Medicine, Chapel Hill, NC; J Perkins PhD, host. December 1979.

1981 Physalaemin-like peptide from rabbit stomach: Diabetes Branch, NIAMDD, NIH, Bethesda, MD; J Roth MD, Chief, host. 28 March 1981.

1982 Of frogs and man—the peptide connection: Department of Pharmacology, University of North Carolina School of Medicine, Chapel Hill, NC; T-C Peng PhD, host. October 1982.

1984 International Workshop on Peptides in Lung Cancer, Marburg, Germany. Physalaemin-like immunoreactivity in human lung small-cell carcinoma: isocratic reversed-phase HPLC analysis of the chemically modified peptide. 15-19 June 1984.

1985 International Conference on Nonmammalian Peptides, National Academy of Lincci, Rome, Italy. Evolutionary relationships between nonmammalian and mammalian peptides. 11-15 May 1985.

1985 **Session Chairman:** Nonmammalian Peptides: Amphibia, Birds and Reptiles. Nonmammalian Peptides, Rome, Italy, 11-15 May 1985.

1987 **Member, Scientific Committee:** Bombesin-like Peptides in Health and Disease, New York Academy of Sciences, Rome, Italy. Neuromedin B: Physiology and pharmacological perturbations. 13-16 October 1987.

1987 Neuromedin B: Application of antibody probes on physiological function. Department of Medical Science and Human Oncology, University of Turin, Torino, Italy; P Comoglio MD, Chairman; 20 October 1987.

1992 **Special Lecturer:** Gordon Conference on Biology and Chemistry of Peptides, Ventura, CA. Molecular determinants required for high selectivity of deltorphin opioid peptides. 10-14 February 1992.

1989 Correlation between gastric acid secretion and brain μ receptors: Brain Research Institute, UCLA; J Fried, host; 26 January 1989.

1990 **Special Lecturer:** Design of selective opioid peptide ligands: Department of Chemical Engineering, UCLA; Y Cohen PhD, host; 17 August 1990.

1994 **Plenary Lecturer:** Friends of the Library Series, North Carolina State University, Raleigh, NC. The toad, ugly and venomous, wears yet a precious jewel in his skin. 29 August 1994.

1995 **Special Lecturer Series:** Center for Drug Evaluation and Research Staff College, Food and Drug Administration, Rockville, MD. Of frogs and man: the opioid bond that cannot be loosed. L Kaus PhD, host; 20 September 1995.

1998 **Invited Lecturer:** Size matters: new frontiers in designing potent δ-opioid antagonists. Department of Pharmaceutical Sciences, Kobe Gakuin University, Kobe, Japan; Y Okada PhD, host; 14 August 1998.

1998 **Plenary Lecturer:** The 3rd Symposium on Frontiers in Protein Chemistry and Biotechnology, Jilin University, Changchun, China. Size matters: new frontiers in designing potent δ-opioid antagonists. 17-20 August 1998.

1998 **Session Chairman:** *ibid*, Jilin University, Changchun, China, 17-20 August 1998.

2000 **Plenary Lecturer:** Annual Conference on Opioid Mimetic Analgesics 1999, Kobe Gakuin University, Kobe, Japan. Recent developments in the design and application of potent opioidmimetics. 24 March 2000.

2000 **Plenary Lecturer:** 120th Annual Meeting of the Pharmaceutical Society of Japan, Gifu, Japan. The Dmt-Tic pharmacophore: exquisite probes for the

internal environment and bioactivity of opioid receptors. 28-31 March 2000.

2001 **Special Lecturer:** Dmt: the opioid affair. The 32nd Meeting of the International Narcotics Research Conference, Helsinki, Finland 14-19 July.

2001 **Plenary Lecturer:** The 4th Symposium on Frontiers in Protein Chemistry and Biotechnology, Chengde, China, 16-20 August.

2001 **Session Chairman:** *ibid*, Chengde, China, 16-20 August.

2002 **Organizing Committee and Plenary Lecturer:** Annual Conference on Opioid Mimetic Analgesics 2001, Kobe Gakuin University, Kobe, Japan, 18-19 March 2002.

2002 **Guest Lecturer:** Methods in opioid peptide research. Department of Pharmaceutical Sciences, Kobe Gakuin University, Kobe, Japan; Y Okada PhD, host; 25 March 2002.

2004 **Special Lecturer:** Designer opioids: ligand formation predicated on hydrophobic correlates. The 35th Meeting of the International Narcotics Research Conference, Kyoto, Japan, 17-23 July 2004.

2004 **Plenary Lecturer:** On the design of opioid mimetic peptides from chemistry to pharmacology: The new frontier in medicinal chemistry and medicine. Kobe Gakuin University, Kobe, Japan, Y Tsuda PhD, host; 26 July 2004.

2005 Pain and pleasure: the opioid conundrum. NIEHS, Laboratory of Pharmacology and Chemistry, John Pritchard, PhD, Chief, host: 24 February 2005.

2006 **Culture Event Lecturer:** Impressionism: interpretation of light and color. Kathy Oldenwald, EEO Director, NIEHS, and Eli Ney, sponsors; 15 November and 6 December 2006.

BIBLIOGRAPHY

1. Peer Reviewed Journals

1. **Lazarus LH**, Levy MR, Scherbaum OH. Inhibition of synchronous cell division in *Tetrahymena pyriformis* by actinomycin D. *Exp. Cell Res*. **1964**, *35*, 672-676

2. **Lazarus LH**, Scherbaum OH. Effect of temperature on the activity of ribonuclease from *Tetrahymena pyriformis*. *J. Cell Physiol*. **1966**, *68*, 95-97.

3. **Lazarus LH**, Scherbaum OH. Activity of a ribosomal phosphodiesterase from a protozoan. *Nature* **1967**, *213*, 887-888.

4. **Lazarus LH**, Scherbaum OH. Isolation and specificity of the intracellular ribonuclease from *Tetrahymena pyriformis*. *Biochem. Biophys. Acta* **1967**, *142,* 368-384

5. **Lazarus LH**, Scherbaum OH. Some properties of the acid phosphatases of *Tetrahymena pyriformis*. *Life Sci*. **1967**, *6*, 2401-2407.

6. **Lazarus LH**, Scherbaum OH. Activity of ribonuclease, acid phosphatase and phosphodiesterase in *Tetrahymena pyriformis* during growth. *J. Cell Biol*. **1968**, *36*, 415-418

7. Popescu M, **Lazarus LH**, Goldblum N. Simplified adaptor for electoelution. *Anal. Biochem*. **1971**, *40*: 247-253.

8. **Lazarus LH**, Olshevsky U, Cymbalista S, Einav G, Goldblum N. On the architecture of foot-and-mouth disease virus. *Rev. Roum. Inframicrobiol*. **1971**, *8*, 205-208.

9. Popescu M, **Lazarus LH**, Goldblum N. Electroelution of RNA: Simplified adaptor for continuous flow and characteristics of the system. *Rev. Roum. Inframicrobiol*. **1971**, *8*, 237-246

10. Popescu M, **Lazarus LH**, Goldblum N. Electroelution of RNA: Characteristics of the system. *Anal. Biochem*. **1972**, *45*, 35-41.

11. **Lazarus LH**, Chou S-C. Modification of the analysis of phosphorus and kinetics of the reaction. *Anal. Biochem*. **1972**, *45*, 557-566

12. Barzilai R, **Lazarus LH**, Goldblum N. Viscosity-density gradient for purification of FMDV. *Arch. gesamt. Virusforsch*. **1972**, *36*, 141-146

13. **Lazarus LH**, Popescu M, Barzilai R, Goldblum N. Spermidine stimulation of RNA-dependent polymerase activity. *Arch. gesamt. Virusforsch*. **1972**, *36*, 311-316, 1972.

14. **Lazarus LH**, Itin A, Popescu M, Goldblum N. Mono- and divalent cationic parameters of foot-and-mouth disease virus replicase. *Eur. J. Biochem*. **1973**, *27*, 335-340.

15. **Lazarus LH**, Itin A. Activity of foot-and-mouth disease virus RNA polymerase in vitro: Inhibition by polyamines and polyamino acids. *Arch. Biochem. Biophys*. **1973**, *154*, 156-160.

16. **Lazarus LH.** A novel system for DNA synthesis in isolated nuclei. *FEBS Lett.* **1973***, 35*, 166-168.

17. **Lazarus LH**, Kitron N. Neomycin inhibition of DNA polymerase. *Biochem. Pharmacol*. **1973**, *22*, 3115-3117.

18. **Lazarus LH**, Kitron N. Cytoplasmic DNA polymerase: Polymeric forms and their conversion to monomers resembling nuclear DNA polymerase. *J. Mol. Biol*. **1973**, *81*, 529-534

19. **Lazarus LH**, Kitron N. Lithium depresses DNA polymerase activity. *Lancet* **1974***, 2*, 225-226

20. **Lazarus LH**, Kitron N. Inhibition and dissociation of mammalian polymeric DNA polymerase by heparin. *Arch. Biochem. Biophys*. **1974**, *164*, 414-419

21. **Lazarus LH**, Barzilai, R. Association of foot-and-mouth disease virus replicase with RNA template and cytoplasmic membranes. *J. Gen. Virol*. **1974**, *23*, 213-218

22. **Lazarus LH**, Itin A. Requirement for double-stranded RNA during the synthesis of FMDV RNA in vitro. *Arch. gesamt. Virusforsch*. **1974**, *45*, 135-140

23. Barzilai R, Finkelkraut E, **Lazarus LH**, Goldblum N. Inhibition of SV40 DNA synthesis by FV3. *J. Gen. Virol*. **1974**, *23*, 335-339

24. Barzilai R, **Lazarus LH**. Inhibition of foot-and-mouth disease virus replicase by FV3 virions. *J. Gen. Virol*. **1974**, *24*, 39-44

25. **Lazarus LH**, Kitron, N. Differentiation and characterization of the cytoplasmic and nuclear deoxyribonucleic acid polymerase from baby hamster kidney cells. *Biochem. Biophys. Acta* **1975**, *402*, 309-322

26. **Lazarus LH**, Kitron N. Fluctuation in activity of the molecular forms of cellular DNA polymerase during infection by SV40. *Arch. Virol*. **1976**, *52*, 113-133.

27. **Lazarus LH**, Lee C-Y, Wermuth B. Application of general ligand affinity chromatography for the mutual separation of deoxyribonuclease and ribonuclease free of protease contamination. *Anal. Biochem*. **1976**, *74*, 138-144

28. Lee C-Y, **Lazarus LH**, Kabakoff DS, Russel PJ, Lavel, M, Kaplan NO. Purification of kinases by general ligand chromatography. *Arch. Biochem. Biophys*. **1976**, *178*, 8-18

29. **Lazarus LH**, Ling N, Guillemin R. ß-Lipotropin as a prohormone for the morphinometic peptides, endorphins and enkephalin. *Proc. Natl. Acad. Sci USA* **1976**, *73*, 2156-2159

30. Lee C-Y, **Lazarus LH**, Kaplan NO. Purification of dehydrogenases and kinases by affinity chromatography. *Enzyme Eng*. **1977**, *3*, 299-311

31. **Lazarus LH**, Brown MR, Perrin MH. Distribution, localization and characteristics of neurotensin binding sites in the rat brain. *Neuropharmacol*. **1977**, *16*, 625-629

32. **Lazarus LH**, Brown MR, Perrin MH. Mast cell binding of neurotensin. I. Iodination of neurotensin and characterization of the interaction of neurotensin with mast cell receptor sites. *J. Biol. Chem*. **1977**, *252*, 7174-7179

33. **Lazarus LH**, Brown MR, Perrin MH, Rivier JE. Mast cell binding of neurotensin. II. Molecular conformation of neurotensin involved in the stereospecific binding to mast cell receptor sites. *J. Biol. Chem*. **1977**, *252*, 7180-7183

34. **Lazarus LH**, Brown MR, Perrin MH, Rivier JE. Verification of both the sequence and conformation of neurotensin in binding to mast cells. *Biochem. Biophys. Res. Commun*. **1977**, *76*, 1079-1085

35. Rivier JE, **Lazarus LH**, Perrin MH, Brown MR. Neurotensin analogs: structure-activity relationships. *J. Med. Chem*. **1977**, *20*, 1409-1414

36. **Lazarus LH**, DiAugustine RP. Radioimmunoassay of the tachykinin peptide physalaemin. Detection of physalaemin-like immunoreactivity in rabbit stomach. *Anal. Biochem*. **1980**, *107*, 350-357

37. **Lazarus LH**, Linnoila, RI, Hernandez O, DiAugustine RP. Neuropeptide in mammalian tissues with physalaemin-like immunoreactivity. *Nature* **1980**, *287*, 555-558

38. DiAugustine RP, **Lazarus LH**, Jahnke GD, Kahn MN, Erisman MD, Linnoila RI: Corticotropin/β-endorphin immunoreactivity in rat mast cells. Peptide or protease? *Life Sci*. **1980**, *27*, 2663-2668

39. Jahnke GD, **Lazarus LH**, DiAugustine RP, Soldato CM, Erisman MD. Peptide degradation by mast cell chymase-heparin complex. *Life Sci*. **1981**, *29*, 397-403.

40. **Lazarus LH**, DiAugustine RP, Khan MN, Jahnke GD, Erisman MD. Application of a sequence-specific radioimmunoassay for the carboxyl terminal region of adrenocorticotropin. *Clin. Chem*. **1981**, *27*, 542-552.

41. Erisman MD, Linnoila RI, Hernandez O, DiAugustine RP, **Lazarus LH.** Human lung small-cell carcinoma contains bombesin. *Proc. Natl. Acad. Sci. USA* **1982**, *79*, 2379-2383

42. **Lazarus LH**, DiAugustine RP, Soldato CM. A substance with immunoreactivity to the peptide physalaemin in mammalian respiratory tissue. *Exp. Lung Res*. **1982**, *3*, 329-341

43. **Lazarus LH**, DiAugustine RP, Jahnke GD, Hernandez O. Physalaemin: An amphibian peptide in human lung small-cell carcinoma. *Science* **1983**, *219*, 79-81 (**48 citations**)

44. Erisman MD, **Lazarus LH**, Jahnke GD, Soldato CM, DiAugustine RP. Joining peptide of proopiomelanocortin. I. Radioimmunoassay and extraction of related peptides from pituitary glands. *Peptides* **1983**, *4*, 475-482

45. Jahnke GD, Soldato CM, Erisman MD, DiAugustine RP, **Lazarus LH.** Joining peptide of proopiomelanocortin. II. Interspecies heterogeneity of the joining peptide fragment. *Peptides* **1983**, *4*, 483-492

46. Jahnke GD, **Lazarus LH.** A bombesin immunoreactive peptide in milk. *Proc. Natl. Acad. Sci. USA* **1984**, *81*, 578-583

47. Hernandez O, Dermott K, **Lazarus LH**. High-performance liquid chromatography of amphibian peptides. Selectivity changes induced by pH. *J. Liquid Chromat*. **1984**, *7*, 893-905

48. Khan MN, Mirel RD, Ontjes DA, Gosh AP, **Lazarus LH**, DiAugustine RP. Adrenocorticotropin radioimmunoassay: Properties of antisera against synthetic ACTH(1-24) and its clinical application. *Hormone Res*. **1984**, *20*, 129-137

49. Conlon JM, Schmidt WE, **Lazarus LH**, Becker HD, Creutzfeldt W. Partial characterization of substance P-like immunoreactivity and physalaemin-like activity in a carcinoid tumor. *Reg. Peptides* **1985**, *11*, 117-123

50. **Lazarus LH**, Hernandez O. Physalaemin-like immunoreactivity from human small-cell carcinoma: Isocratic reversed-phase HPLC analysis of the chemically modified peptide. *Rec. Resul. Cancer Res*. **1985**, *99*, 56-66.

51. Guglietta A, Strunk CL, Irons BJ**, Lazarus LH**. Central neuromodulation of gastric secretion by bombesin-like peptides. *Peptides* **1985**, *6*, 75-81

52. Gaudino G, Fasolo A, Merlo G, **Lazarus LH**, Renda T, D'Este L, Melchiorri P, Vandesande F. Active peptides from amphibian skin are also amphibian neuropeptides. *Peptides* **1985**, *6*, 209-214

53. **Lazarus LH**, Wilson WE, Gaudino G, Irons BJ, Guglietta A. Evolutionary relationship between nonmammalian and mammalian peptides. *Peptides* **1985**, *6*, 295-307

54. Van Dongen PAM, Theodorsson-Norheim E, Brodin E, Hökfelt T, Grillner S, Peters A, Cuello AC, Forssmann WG, Reinecke M, Singer E, **Lazarus LH.** Immunohistochemical and chromatographic studies of peptides with tachykinin-like immunoreactivity in the central nervous system of the lamprey. *Peptides* **1986**, *7*, 297-314

55. Wilson WE, Harvan DJ, Hamm C, **Lazarus LH**, Klapper DG, Yajima H, Hayashi Y. Physalaemin-like immunoreactive peptides from rabbit stomach. *Int. J. Peptide Prot. Res*. **1986**, *28*, 58-66

56. **Lazarus LH**, Gaudino G, Wilson WE, Erspamer V. An immunoreactive peptide in milk contains bombesin-like bioactivity. *Experientia* **1986**, *42*, 822-823.

57. Fujii N, Hayashi Y, Akaji K, Funakoshi S, Shimamura M, Yuguchi S, **Lazarus LH**, Yajima H. Studies on peptides. CXLIX. Solid-phase synthesis of a rabbit stomach peptide by application of a new polymer support and a new deprotecting procedure. *Chem. Pharm. Bull*. **1987**, *35*, 1266-1269

58. Guglietta A, Irons BJ, **Lazarus LH**, Melchiorri P. Structure-activity relationship of dermorphin on gastric secretion. *Endocrinology* **1987**, *120*, 2137-2143

59. **Lazarus LH**, Irons BJ, Grimes LM, Wilson WE, Guglietta A, Yajima H. Assessment of neuromedin B polyclonal antibodies as molecular probes in neural tissue. *J. Neurosci. Meth*. **1988**, *23*, 161-172

60. Guglietta A, Irons BJ, **Lazarus LH**, Sivam SP. Effects and mechanism of action of lithium chloride on gastric acid secretion in rats. *Gastroenterology* **1988**, *95*, 1454-1459

61. Guglietta A, Irons BJ, **Lazarus LH.** Effect of bombesin, dermorphin and salmon calcitonin on gastric secretion in rats. *Methods Find. Exp. Clin. Pharmacol*. **1988**, *10*, 481-485

62. Renda T, D'Este L, Fasolo A, **Lazarus LH**, Minniti F, Erspamer V. Brain-gut-skin peptides: An update and overview. *Arch. Histol. Cytol*. **1989**, *52*, 317-323

63. **Lazarus LH**, Guglietta A, Wilson WE, Irons BJ, de Castiglione R. Dimeric dermorphin analogues as specific μ-receptor probes on rat brain membranes. Positive correlation between central μ-receptors and suppression of gastric acid secretion. *J. Biol. Chem*. **1989**, *264*, 354-362

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