
Andrew Z. Mason Ph.D.

Professor

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EDUCATION:

1972-1975: B.Sc., University College of North Wales, University of Wales, UK.

Major: Zoology and Marine Zoology
Minor: Oceanography

1975-1979: Ph.D., University College of North Wales, University of Wales, UK.

Cell Biology and Marine Biology:
Title: The Uptake, Accumulation and Excretion of Metals by the Marine Prosobranch Gastropod
Littorina littorea.

PROFESSIONAL EXPERIENCE:

1993-present: Professor. Department of Biological Sciences, California State University, Long Beach. USA.

1989-1993: Associate Professor. Department of Biological Sciences, California State University, Long Beach. USA.

1985-89: Research Associate Professor. Molecular Ecology Institute, California State University, Long Beach. USA.

1984-85: Lecturer (Assistant Professor). Department of Biomedical Engineering, Institute of Orthopaedics, Postgraduate Medical Federation, U.C., University of London. United Kingdom.

1983-84: MRC Post Doctoral Research Associate. School of Biological Sciences, University of Sussex. United Kingdom.

1980-82: NERC Post Doctoral Research Associate. Department of Pure and Applied Zoology, University of Reading. United Kingdom.

FELLOWSHIPS AND SCHOLARSHIPS AWARDED:

1975-1979. Natural Environmental Research Council Doctorate Fellowship.

1980-1982. Natural Environmental Research Council Postdoctoral Fellowship.

1983-1984. Medical Research Council Postdoctoral Fellowship.

TEACHING AWARDS AND HONORS:

1994-1995. Merryfield Award. Outstanding Faculty Member in College of Natural Sciences and Mathematics.

1996-1997. Associated Student Outstanding Instructor of the Year.

INSTRUCTIONAL EXPERIENCE:

A) Teaching Assignments:

Undergraduate and postgraduate lecturing experience in General Biology, Cell and Molecular Biology, Metalloprotein Biochemistry, Electron Microscopy, Histology, Histochemistry, Molluscan Physiology, Marine Biology, Aquatic and Toxicology, Biomechanics and Invertebrate Physiology, Research Design and Methods.

B) Current Post baccalaureate supervision:

Academic tutor and supervisor for postgraduates registered for the higher degrees of M.Sc. (while at CSULB) and Ph.D (during tenure at University of London).

MASTERS THESES AWARDED:

Palmier, C. (1993). Preparation of a Genomic library from *Littorina littorea*.
Brown, J. (1995). Hemocyanin synthesis by Prosobranch Pore Cells.
Moffett, C. (1998). The Effects of Cadmium on Copper Deficient Cells
Delmonte, S. (1999). Testosterone and Tributyltin Metabolism in *Littorina littorea*: An investigation of TBT induced imposex in a Marine Gastropod Mollusc.

ACADEMIC REVIEW PANELS:

Journals:

Aquatic Toxicology
Journal of the Marine Biological Association of the United Kingdom.
Scanning Electron Microscopy.
Marine Environmental Research.
Bulletin of Marine Science.
Bulletin of the Southern California Academy of Sciences.
Comparative Biochemistry and Physiology.

Grants:

Natural Environmental Research Council, UK.
Department of Energy, USA.
Natural Sciences and Engineering Research Council of Canada.
National Science Foundation.
SeaGrant
National Oceanographic and Atmospheric Administration

Books:

American Chemical Society Book Series.

Editorial Panels:

Marine Environmental Research.

Funding Agencies:

National Institute of Health Review Panel.

MEMBERSHIPS OF PROFESSIONAL SOCIETIES:

- i) Chair, CSU State-wide Electron Microscopy Committee, 1990-1991.
 - ii) Second Vice President, Southern California Society for Electron Microscopists: 1991-1992.
 - iii) First Vice President, Southern California Society for Electron Microscopists: 1991-1992
 - iv) President, Southern California Society for Electron Microscopists: 1992-1993
 - iv) Member of Subcommittee on Commission on Environmental Chemistry. IUPAC
 - v) Sigma XI: 1988-90.
 - vi) Member of Marine Biological Association of the United Kingdom.
 - vii) American Society of Zoology.
 - viii) Microscopical Society of America.
 - ix) Southern California Environmental Chemistry Society.
 - x) First Vice President, Southern California Society for Microscopy: 1997-1998.
 - xi) President, Southern California Society for Microscopy: 1998-1999.
 - xii) Treasurer, Local Affiliate Society, Microscopical Society of America National Meeting Long Beach. Aug 5th-12th, 2001.
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PRESENTATIONS AT SYMPOSIA AND SCIENTIFIC MEETINGS:

MASON, A.Z. (Feb. 1980) Mathematical modeling to determine the kinetics of ^{65}Zn transfer in anatomical and physiological compartments. Presented at: The Society for Experimental Biology, University of Newcastle, U.K.

MASON, A.Z. & NOTT, J.A. (May 1981) Role of inorganic deposits in the cellular detoxification and regulation of metals. Presented at: The First International Symposium on Responses of Marine Organisms to Pollutants, Plymouth, U.K.

MASON, A.Z. (June 1982) Applications of microincineration in localizing biomineralized inorganic deposits in sectioned tissues. Presented at: The Fourth International Symposium on Biomineralization, Amsterdam, Holland.

MASON, A.Z. (Jan. 1983) Metal accumulation - an experimental approach. Presented at: The Society for Experimental Biology, University of Bristol, U.K.

SIMKISS, K. & MASON, A.Z. (April 1983) Bioaccumulation of metals - a conceptual approach. Presented at: The Second International Symposium on Responses of Marine Organisms to Pollutants, Woods Hole Marine Station, Massachusetts, U.S.A.

ALI, S.Y., REES, J. and MASON, A.Z. (June 1985). The role of cuboid crystals in human arthritic cartilage in causing osteoarthritis. Presented at: The IV International Conference on Cell Mediated Calcification, Jesus College, University of Cambridge, U.K.

MASON, A.Z. (June 1986). Cellular systems involved in metal recognition. Presented at: The Gordon Research Conference on Estuarine Processes, Plymouth, New Hampshire.

JENKINS, K. and MASON, A.Z. (April 1987). Mechanisms of Cd and Zn accumulation in the polychaete *Neanthes arenaceodentata*. Presented at: The Fourth International Symposium on Responses of Marine Organisms to Pollutants, Woods Hole Marine Station.

MASON, A.Z. (April 1987). Zinc uptake, accumulation and excretion by the marine prosobranch gastropod *L. littorea*. Presented at: The Fourth International Symposium on Responses of Marine Organisms to Pollutants, Woods Hole Marine Station, Massachusetts, U.S.A.

JENKINS, K. and MASON, A.Z. (Sept. 1987). Relationships between metal speciation and metal accumulation and subcellular distributions in polychaetes. Presented at: The Bioavailability of Trace Metals Symposium; at the 194 Annual Meeting of the American Chemical Society, New Orleans, Louisiana, U.S.A.

MASON, A. Z. and JENKINS, K. (Nov. 1987). Metal bioavailability and accumulation in marine invertebrates. Presented at: The 8th Annual Meeting of the Society of Environmental Toxicology and Chemistry. Pensacola.

MASON, A.Z., HOWE, S. and JENKINS, K. (Jan. 1988). Direct analysis of high performance liquid chromatography eluent by inductively coupled plasma mass spectroscopy. Presented at: Winter Conference on Plasma Source Atomic Spectroscopy. San Diego. U.S.A.

MASON, A.Z. and STORMS, S.D. (Feb. 1988). Analysis of metallothionein in polychaetes by direct high performance liquid chromatography-inductively coupled plasma mass spectroscopy. Presented at: Gordon Research Conference on Estuarine Processes. Ventura. U.S.A.

JENKINS, K.D. and MASON, A.Z. (April 1988). Mechanisms of Cadmium and Zinc accumulation in the polychaete *Neanthes arenaceodentata*. Proceedings of 4th International Symposium on Responses of Marine Organisms to Pollutants. Woods Hole. Massachusetts. Mar. Environ. Res. 24, 173-174

MASON, A. Z. and JENKINS, K. (Sept. 1988). Low molecular weight binding Ligands: Indicators of metal- induced stress? Presented at: Division of Environmental Chemistry; at the 196th Annual Meeting of the American Chemical Society, Los Angeles, U.S.A.

MASON, A.Z. (Dec 1989): Metal speciation in biological samples and natural waters by chromatography interfaced inductively coupled plasma mass spectroscopy. 1989 International Chemical Congress of Pacific Basin Societies, Honolulu Hawaii. Presented at the 196th Annual Meeting of the American Chemical Society.

GULLY, J. and MASON, A.Z. (June 1990). A technique for studying copper metabolism in marine invertebrates using stable isotopic ratio analysis. Presented at 8th International Marine Biology Symposium, Ensenada, Mexico.

MASON, A.Z. (Oct. 1990). ICPMS: A new technology for studying metal metabolism and homeostasis. First Annual Long Beach Research Conference, Long Beach.

MASON, A.Z. (April 1991). Applications of Inductively Coupled Plasma Mass Spectroscopy for the study of metal metabolism in marine organisms. 6th International Symposium on Responses of Marine Organisms to Pollutants. Woods Hole. Massachusetts.

JENKINS, K.D. and MASON, A.Z. (Oct. 1991). Relationships between Cd^{2+} activity cadmium bioaccumulation and sublethal toxicity in the polychaete *Neanthes arenaceodentata*: 18th Annual Aquatic Toxicity Workshop. Ottawa, Canada.

MASON, A.Z. (Nov. 1991). Quantitative energy dispersive X- ray microanalysis of biomineralized concretions from the cells of *Littorina littorea*. 1st CSU Electron Microscopy Colloquium. Long Beach.

MASON, A. Z. (May 1992). Competitive Interactions between metals for cytosolic ligands: A basis for Metal Toxicity. American Geophysical Union Spring Meeting. Montreal, Canada.

MASON, A.Z. (June 1993). Molluscs as indicators of Coastal Pollution, Symposium on Contemporary Research on Mollusca, Western Society of Malacologists, La Jolla, California.

MASON, A.Z. (April 1993). Copper Turnover between Cells and Proteins. 2nd CSU Electron Microscopy Colloquium, San Leandro, California.

MASON, A.Z. (April 1994). Low Temperature Ashing Procedures for Microscopy and Microanalysis. 3rd CSU Electron Microscopy Colloquium, San Bernadino, California.

MASON, A.Z. (June 1994). Metal Excesses and Deficiencies: Two sides of the same toxicological coin. Tenth International Symposium on Marine Biology, Ensenada, Mexico.

MASON, A.Z. (Oct 1994). Competitive Interactions between Cd and Cu for metallothionein-like proteins. 21st Aq. Tox. Workshops, Sarnia, Ontario, Canada.

RONIS, M. and MASON, A.Z.(April 1995). The metabolism of testosterone by the periwinkle (*Littorina littorea*) *in vitro* and *in vivo*: Effects of Tributyl tin. 8th International Symposium on Responses of Marine Organisms to Pollutants. Asilomar, California.

MASON, A.Z. and RONIS, M. (May 1995). Tributyl tin induced steroidal imbalance and imposex in marine gastropods. Southern California Academy of Sciences Symposium on Toxicology and Chemistry: Environmental perspective. California State University Fullerton, California.

MASON, A. Z. and RONIS, M.J.J. (May 5-6th 1996). Tributyltin induced sex reversal in molluscs. 4rd CSU Electron Microscopy Colloquium, San Diego, California.

MASON, A.Z. (June 1996). Sex and Chemistry. Ministry of Agriculture and Fisheries. Burnham on

Crouch, U.K.

MASON, A.Z. and MERAZ, R. (Nov. 1996). Cytosolic Metal Speciation by Sequential On-line, SE-IE/HPLC-ICPMS. CSULB/LBMMC/VAMCLB Seventh Annual Long Beach Research Symposium. Long Beach, California.

MASON, A.Z. (Oct 1996). Sex, Chemistry and Pork-Pies. Department of Biological Sciences, California State University Long Beach.

MASON, A.Z. and MERAZ, R. (April, 1997). Cytosolic Metal Speciation Studies by Sequential, On-line, SE-IE/HPLC-ICPMS. 9th International Symposium on Responses of Marine Organisms to Pollutants. Bergen, Norway.

WOLF, STEVEN J., JEFFREY R. BELL, ROBERT A. DESHARNAIS, HENRIK KIBAK and ANDREW Z. MASON. EvolveIT - a World Wide Web based simulation for the teaching of evolution. American Institute of Biological Sciences annual meeting. Montreal, Canada, August 5, 1997.

MASON, A.Z. (October 1997). SE-IE/HPLC-ICPMS for the determination of metalloprotein complexes in marine invertebrates. 24th Aq. Tox. Workshops, Niagara Falls, Ontario, Canada.

MASON, A.Z. (December 1997). Biological Effects and Thresholds of Chemical Contaminants. Southern California Environmental Chemists Society.

MASON, A.Z. and BORJA, M. 2000. HPLC-ICPMS: A novel technique for studying the kinetic transfer of Cu between proteins. Southern California Society for Microscopy and Microanalysis, Anaheim. 2 March 2000.

MASON, A.Z. and BORJA, M. 2000. The development of a new technique for monitoring the kinetic exchange of metals in proteins. CSU San Marcos. 5 April 2000.

MASON, A.Z. and BORJA, M. 2000. Metal Toxicity: Wrong Metal, Wrong Time, Wrong Place. Southern California Environmental Chemists Society. Southern California Coastal Water research project. Westminster. 5 April 2000.

MASON, A.Z. (2000) Chromatography Interfaced ICP-MS. Metal Transfer in Proteins. Sponsored by Perkin Elmer Corporation. May 31st 2000, Buena Park Holiday Inn; June 1st 2000, Pleasanton Hilton, Pleasanton; June 7th 2000, Greenwood Inn, Beaverton Oregon.

PUBLICATIONS:

GEORGE, S.G., NOTT, J.A., PIRIE, B.J.S. and MASON, A.Z. (1976). A comparative quantitative study of cadmium retention in tissues of a marine bivalve during different fixation and embedding procedures. Proc. R. Microsc. Soc. (Micro '76 Suppl.) 11:42.

MASON, A.Z. and NOTT, J.A. (1980). A rapid, routine technique for the X-ray microanalysis of microincinerated cryosections: an SEM study of inorganic deposits in tissues of the marine gastropod *Littorina littorea* (L.). J. Histochem. Cytochem. 28:1301-1311.

MASON, A.Z. and NOTT, J.A. (1980). The association of the blood vessels and the excretory epithelium in the kidney of *Littorina littorea* (L.) (Mollusca, Gastropoda). Mar. Biol. Letters. 1:355-365.

MASON, A.Z. and NOTT, J.A. (1981). The role of intracellular biomineralized granules in the detoxification of metals in gastropods with special reference to the marine prosobranch *L. littorea* (L.). Aquatic Toxicology 1:239-256.

SIMKISS, K. and MASON, A.Z. (1983). Metal ions: Metabolic and Toxic effects. In: Biology of Mollusca. Edited by K.M. Wilbur. Academic Press, New York. pp. 101-164.

MASON, A.Z. and SIMKISS, K. (1982). Sites of mineral deposition in metal accumulating cells. Exptl. Cell Res. 139:383-391.

MASON, A.Z. (1983). Applications of microincineration in localizing biomineralized inorganic deposits in sectioned tissues. In: Biomineralization and Biological Metal Accumulation. pp. 378-387. Edited by P. Westbrock and E.W. de Jong. Reidel Publs. Co. Amsterdam Holland.

MASON, A.Z. (1983). The uptake, accumulation and excretion of metals by the marine prosobranch gastropod mollusc *Littorina littorea* (L.) Ph.D. Thesis pp 960. University of Wales.

MASON, A.Z. and SIMKISS, K. (1983). Interactions between metals and their distributions in tissues of *Littorina littorea* (L.) collected from clean and polluted sites. J. Mar. Biol. Ass. U.K. 63:661-672.

MASON, A.Z., SIMKISS, K. and RYAN, K. (1984). Ultrastructural localization of metals in specimens in *Littorina littorea* (L.) from polluted and non-polluted sites. J. Mar. Biol. Ass. U.K. 64:699-720.

SIMKISS, K., TAYLOR, M. and MASON, A.Z. (1982). Bioaccumulation and detoxification of metals by marine molluscs - A review. Mar. Biol. Letters. 3:187-201.

SIMKISS, K. and MASON, A.Z. (1984). Cellular responses of molluscan tissues to environmental metals. Mar. Environ. Res. 14:103-118.

MASON, A.Z. and NOTT, J.A. (1985). Inter-laboratory comparability studies of measurements of trace elements using quantitative X-ray microanalysis. Optical and Electron Microscopy, Vol. 10:11.

REES, J.A., ALI, S.Y. and MASON, A.Z. (1985). Scanning electron microscopy and microanalysis of "cuboid" crystals in human articular cartilage. Cell Mediated Calcification on matrix vesicles. pp 110-117, IV. International Conference on matrix vesicles. Jesus College, University of Cambridge.

JENKINS, K.D. and MASON, A.Z. (1988). Mechanisms of Cadmium and Zinc accumulation in the polychaete *Neanthes arenaceodentata*. Mar. Environ. Res. 24, 173-174.

MASON, A.Z., JENKINS K.D. and SULLIVAN P.A. (1988). Mechanisms of trace metal accumulation in the polychaete *Neanthes arenaceodentata*. J. Marine Biol. Ass. U.K. 68:61-80.

JENKINS, K.D. and MASON, A.Z. (1988). Relationships between subcellular distributions of cadmium and perturbations in reproduction in the polychaete *Neanthesarenaceodentata*. Aq. Toxicol. 12:229-244.

MASON, A.Z. (1988). Kinetics of ⁶⁵Zn uptake, accumulation and excretion by the marine gastropod

mollusc *Littorina littorea*. Mar. Environ. Res. 24:135-139.

STORMS, S.D., MASON, A.Z. and JENKINS, K.D. (1988). Zinc and cadmium accumulation in the errant marine polychaete *Neanthes arenaceodentata*; Saturation and Competition. FASEB Journal, Vol 2, March 1988.

MASON, A.Z. (1989). An ICP-MS study of saline induced corrosion of stainless steel HPLC components-Is there a need to go to inert systems? Chromatogram. 10, 7-10.

MASON A.Z. and JENKINS, K.D. (1990). Effects of feeding on zinc and cadmium accumulation by the polychaete *Neanthes arenaceodentata*: Chemical Speciation and Bioavailability 2, 33-47.

MASON, A.Z., STORMS, S.D. and JENKINS, K.D. (1990). Metallothionein separation and analysis by directly coupled size exclusion high performance liquid chromatography inductively coupled plasma mass spectroscopy. Anal. Biochem. 186, 187-201.

MASON A.Z. and JENKINS, K.D. (1991). Effects of Cadmium Bioavailability on the Cytoplasmic Accumulation of Cadmium in *Neanthes arenaceodentata*. Bulletin of Marine Science, 48, 524-529.

GULLY, J.R. and MASON, A.Z. (1991). A technique for removing Na⁺ from Biological samples prior to 63/65 Cu Stable Isotopic Ratio Analysis by Inductively Coupled Plasma Mass Spectroscopy. Proceedings of the 8th International Biology Symposium pp. 95-103.

MASON, A. Z. (1992). Competitive Interactions between metals for cytosolic ligands: A basis for Metal Toxicity. (Abstract). EOS, Transactions of the American Geophysical Union 1992 Spring Meeting, 73, (14) 164. April 7, 1992/Supplement

MASON, A.Z., and STORMS, S.D. (1993). Applications of directly coupled size exclusion high performance chromatography inductively coupled plasma mass spectroscopy in environmental toxicology studies; a study of metal-ligand interactions in cytoplasmic samples. Mar. Environ. Res. 35, 19-23.

MASON, A.Z. and GULLY, J.R. (1993). Identification of sites of Cu accumulation and turnover by stable isotopic ratio analysis. Mar. Environ. Res. 35, 59-63.

GULLY, J.R. and MASON, A.Z. (1993). Cytosolic redistribution and enhanced accumulation of copper resulting from cadmium exposure in the gill tissue of *Littorina littorea*. Mar. Environ. Res. 35, 53-57.

MASON, A.Z. (1994). Low Temperature Ashing Procedures for Microscopy and Microanalysis. J.Electron. Microsc. Tech. 29, 494.

MASON, A.Z., GHARAKHANIAN, E. and CARLBERG, D. (1994). Laboratory Manual for the Biological Sciences. Burgess Publishing, ISBN# 0-8087-9993-2. 1st Ed., 1994; 2nd Ed., 1995; 3rd Ed., 1996; 4th Ed., 1997; 5th Ed., 1998; 6th Ed., 2000.

LAYNE, J. and MASON, A.Z. (1994). The ultrastructural response of *Ulva* to Cd.. J.Electron. Microsc. Tech. 29, 493.

MOFFET, C. and MASON, A.Z. (1994). An ultrastructural comparison of cnidocytes in two life stages

of *Aurelia aurita*. J. Electron. Microsc. Tech. 29, 494.

RAJAB, A. and MASON, A.Z. (1994). Ultrastructural changes in the dinoflagellate *Amphidinium* cateria caused by U.V. radiation. J. Electron. Microsc. Tech. 29, 494.

MASON A.Z. and JENKINS, (1995). Metal Speciation and Bioavailability in Aquatic International Union of Pure and Applied Chemistry series (IUPAC). Chapter 10: Metal Detoxification in Aquatic Organisms. Pp 479-609. J. Wiley Publishers. (Eds. A. Tessier and D.R. Turner).

RONIS, M. and MASON, A.Z.(1996). The metabolism of testosterone by the periwinkle (*Littorina littorea*) *in vitro* and *in vivo*: Effects of Tributyl tin. Mar. Environ. Res. 42, 161-166.

WOLF, S.J., BELL, J.R., DESHARNAIS, R.A., KIBAK, H. and MASON, A.Z. (1997). EvolveIT - a World Wide Web based simulation for the teaching of evolution. Amer. J. Bot. 84: 261.

MASON, A.Z. and MERAZ, R.(1998). Cytosolic Metal Speciation Studies by Sequential, On-line, SE-IE/HPLC-ICPMS. Mar. Environ. Res. 46, 573-577.

VALENCIA, R, GERPE, M, TRIMMER, J, TORY BUCKMAN, T. MASON, A.Z. and OLSSON, P-E. (1998). The Effect of Estrogen on Cadmium Distribution in Rainbow Trout (*Oncorhynchus mykiss*). Mar. Environ. Res. 46, 167-171.

STUDENT PRESENTATIONS:

STORMS, S.D., MASON, A.Z. and JENKINS, K.D. (1988). Zinc and cadmium accumulation in the errant marine polychaete *Neanthes arenaceodentata*; Saturation and Competition. FASEB Journal, Vol 2, March 1988.

GULLY, J. AND MASON, A.Z. (1990). A technique for studying copper metabolism in marine invertebrates using stable isotopic ratio analysis. Presented at 8th International Marine Biology Symposium, Ensenada, Mexico. June 4th-8th. 1990.

GULLY, J. AND MASON, A.Z. (1991). Cytosolic redistribution and enhanced accumulation of Cu resulting from cadmium exposure in the gill of tissue of *Littorina littorea*. 6th International Symposium on Responses of Marine Organisms to Pollutants. Woods Hole. 24-26 April 1991.

SUGAR, M., MASON, A.Z. and DOUGLASS, T.G. An ultrastructural study of the Epicardium of *Littorina littorea* (Mollusca, Gastropoda, Prosobranchia): A putative site of ultrafiltration. Southern California Academy of Sciences, Natural History Museum, USC. May 10th, 1991.

BROWN, J. and MASON, A.Z. Hemocyanin synthesis by the Pore Cells of the marine prosobranch mollusc *Littorina littorea*. 1st CSU Electron Microscopy Colloquium, 22-24 Nov. 1991. Long Beach.

SUGAR, M. and MASON, A.Z. An ultrastructural study of the heart of *Littorina littorea* (Mollusca, Gastropoda, Prosobranchia): 1st CSU Electron Microscopy Colloquium, 22-24 Nov. 1991. Long Beach.

MEZA, J. and MASON, A.Z. (1991). Metallothionein isolation and purification from the marine gastropod mollusc *Littorina littorea*. NIGMS Minority Programs Symposium, Nov. 3-6th, 1991,

Washington, D.C.

HARPER, R. and MASON, A.Z. (1993). Ultrastructural Evaluation of the effects of freezing rate on cell damage in the marine prosobranch *Littorina Littorea*. Second CSU Electron Microscopy Conference. 23-24th April, San Leandro. California.

MASON, A.Z. and BROWN J.E. (1993). Copper Turnover between Cells and Proteins. Second CSU Electron Microscopy Conference. 23-24th April, San Leandro. California.

KAMINSKY, M. E. and MASON.A.Z. (1993). Ultrastructural localization of iron in the stomach epithelial cells of a marine mollusc. Southern California Academy of Sciences. June 4-5th. Long Beach.

PALMIER, C. and MASON, A.Z. (1993). Generation of a Genomic Library from the marine mollusc *Littorina Littorea*. Western Society of Malacologist Symposia. 27th June- 1 July. La Jolla, California.

MENON, J., MASON, A.Z. and ARP, A. (1993). Lysosomal and Mitochondrial Morphology in Sulphide Exposed Epithelia of *Urechis caupo*. American Society of Zoologists, Dec 23-30, Los Angeles.

SETO, S.L., MASON, A.Z. and ARP, A. (1993). Anal Vesicle granules accumulate sulfur and iron in *Urechis caupo*. American Society of Zoologists, Dec 23-30, Los Angeles.

LAYNE, J. and MASON, A.Z. (1994). The ultrastructural response of *Ulva* to Cd. 3rd CSU EM Colloquium. April 8-10, San Bernadino.

MOFFET, C. and MASON, A.Z. (1994). An ultrastructural comparison of cnidocytes in two life stages of *Aurelia aurita*. 3rd CSU EM Colloquium. April 8-10, San Bernadino.

RAJAB, A. and MASON, A.Z. (1994). Ultrastructural changes in the dinoflagellate *Amphidinium cateria* caused by U.V. radiation. 3rd CSU EM Colloquium. April 8-10, San Bernadino.

RANDALL, J and MASON, A.Z. (1994). Metal binding and detoxification by intracellular biomineralized concretions. SAS Student Research Symposium. Sponsored by HHMI and NIH. Aug. 25th 1994.

BITAR, F., LAYNE, J. and MASON, A.Z. (1994). Role of metallothionein in metal induced deactivation of cytochrome C oxidase. SAS Student Research Symposium. Sponsored by HHMI and NIH. Aug. 25th 1994.

WILLSIE, J.K., MASON, A.Z. and ARP, A.J. (1995). Sulphide detoxification pathways in *Urechis caupo*: tracking sulfur via ³⁵S labelling and HPLC. Society for Experimental Biology, Birmingham, England.

BORJA, M., JOHNSON, M., and MASON, A.Z. (1996). An ultrastructural study on the transportation and intracellular incorporation of nematocysts by the predatory nudibranch mollusc *Hermisenda crassicornis*. Committee for Advanced Science Training Symposium. California Museum of Science and Industry, Los Angeles. Feb 3.

JOHNSON M. and MASON, A.Z. (1996). An ultrastructural study on the transportation and intracellular incorporation of nematocysts by the predatory nudibranch mollusc *Hermisenda crassicornis*. CSULB

Undergraduate Research Symposium. March 9th 1996.

RANDALL, J. VALENCIA, R., DELMONTE, S., BOYLE, J. and MASON, A.Z. (1995). Tributyl tin accumulation and metabolism by the marine gastropod *Littorina littorea*. NIGMS Conference, Washington, D.C. Oct. 11-15.

BORJA, M., JOHNSON, M. and MASON, A.Z. (1996). An Ultrastructural Study on the Transportation and Intracellular Incorporation of Coelenterate Nematocysts by the predatory nudibranch mollusc *Hermisenda crassicornis*. 4th CSU EM Colloquium. May 4-6th, San Diego.

VALENCIA, R.M., MASON, A. Z., RISEBOROUGH, R., CLENDENEN, D. and LOWENSTEIN, L. (1996). A preliminary Evaluation of the Toxicological Effects of Ingested Pb, Cu and Bi on California Condors (*Gymnogyps californianus*). CSNM Student Research Competition.

VALENCIA, R.M., TRIMMER, J.E., BUCKMAN, T.L. and MASON, A. Z. (1996). The Metabolic Effects of Cadmium During Oestradiol-17 B induction of Vitellogenesis in Rainbow Trout (*Oncorhynchus mykiss*). CSNM Student Research Competition.

PHAM, M.E., MOFFETT, C., ABBOTT, M., LEWIS, A. and MASON, A.Z. (1996). The Development of a Cu deficient cell line. CSNM Student Research Competition.

DELMONTE, S., RANDALL, J., VALENCIA, R.M., BOYLE, J. And MASON, A.Z. (1996). Testosterone and Tributyltin Metabolism by *Littorina littorea*: An Investigation of TBT induced Imposex among Marine Gastropod Molluscs. CSNM Student Research Competition.

MERAZ, R., GOODRICH, V, T. and MASON, A.Z. (1996). The effects of continued Cd exposure on Cu accumulation and speciation in the cytosol and whole parts of various tissues of *Littorina littorea*. CSNM Student Research Competition.

VALENCIA, R, GERPE, M, TRIMMER, J, TORY BUCKMAN, T. MASON, A.Z. AND OLSSON, P-E. (April, 1997). The Effect of Estrogen on Cadmium Distribution in Rainbow Trout (*Oncorhynchus mykiss*). 9th International Symposium on Responses of Marine Organisms to Pollutants. Bergen, Norway.

BRYANT, J., JOHNSON, M., MERAZ, R. and MASON, A.Z. (August 1997). Purification of Metallothionein form the marine Gastropod *Littorina littorea*. CSNM Student Research Symposium, Aug. 28 1997.

BRYANT, J., JOHNSON, M., MERAZ, R. and MASON, A.Z. (August 1997). Characterization and Quantification of mBBR Labeled thiolic proteins using HPLC with fluorometric detection. CSNM Student Research Symposium, Aug. 28 1997.

OPIE, L., PETTIS, A., RODGERS, J. BOYLE, J, GONSALVES, J, ORIHUELA, V. and MASON, A.Z. (August 1997). A study of the induction of metallothionein synthesis on Exposure to Cadmium, Copper and Zinc in the mollusc *Littorina littorea*. CSNM Student Research Symposium, Aug. 28 1997.

RANDALL, J., OROZOCO, A., and MASON, A.Z. (August 1997). The effects of Tributyltin on testosterone uptake and metabolism within the marine Gastropod *Littorina littorea*. CSNM Student Research Symposium, Aug. 28 1997.

VALENCIA, R, GONSALVES, J., SILVERMAN, MASON, A.Z., A. CLENDENAN, D. RISEBOROUGH, R. RIDEOUT, B., SUTHERLAND-SMITH, M., ZUBA, J.R. and WELDY, S.H. (August 1997). Toxicological effects of copper and tungsten-tin-bismuth (TTB) bullets on California Condors (*Gymnogyps californianus*). CSNM Student Research Symposium, Aug. 28 1997.

VALENCIA, R, GERPE, M, TRIMMER, J, TORY BUCKMAN, T. MASON, A.Z. AND OLSSON, P-E. (April, 1997). The Effect of Estrogen on Cadmium Distribution in Rainbow Trout (*Oncorhynchus mykiss*). 9th International Symposium on Responses of Marine Organisms to Pollutants. Bergen, Norway.

VALENCIA, R, SILVERMAN, HUA, S., MASON, A.Z., CLENDENAN, D. RISEBOROUGH, R. An Assessment of the Toxicological Effects of Ingested Copper and Tungsten-Tin-Bismuth (TTB) Bullets on the California Condor (*Gymnogyps californianus*). National Minority Research Symposium, New Orleans, Louisiana. 1997.

FRANCIS, S., MICHAIL, M., CUMMINGS, I., HUYHN, H., PHAN, L., MERAZ, R. and MASON, A.Z. (1998) Preliminary Evaluation of the use of stable isotopic analyses to monitor the kinetics of Cu loss from tissues. CSNM Student Research Symposium, Aug. 1998.

VALENCIA, R.M and MASON, A.Z. (1998). Toxicological Effects from Bullets on the California Condor. WCAS Analy. Digest. 6, 1-2.

MERAZ, R. and MASON, A.Z. An ICP-MS Study of Cu Metabolism in the marine Prosobranch Mollusc *Littorina littorea*. National Minority research Symposium. November 23rd 1998 New York.

MERAZ, R. and MASON, A.Z. An ICP-MS Study of Cu Metabolism. 9th Annual Long Beach Research Symposium. Nov 20th 1998

VALENCIA, R, SILVERMAN, MASON, A.Z., CLENDENAN, D. RISEBOROUGH, R. An Assessment of the Toxicological Effects of Ingested Copper and Tungsten-Tin-Bismuth (TTB) Bullets on the California Condor (*Gymnogyps californianus*). S. California Academy Sci., Pomona, 1998.

BORJA, M, HARRIS, M and MASON, A.Z. Estimations of Cu turnover in cytosolic proteins of the visceral complex of *Littorina littorea* by stable isotopic dilution analysis and coupled HPLC/ICP-MS. CNSM Student Research Symposium, August, 1999.

MERAZ, R. August 1999. Metal substitutions and interactions in the digestive gland of crabs. Department of Molecular Biology, Odense University, Denmark.

BORJA, M, HARRIS, M and MASON, A.Z. Cu Turnover in Cytosolic Proteins of the Visceral Complex of *Littorina littorea* by Stable Isotopic Ratio Analysis and coupled HPLC/ICP-MS. (1999) National Minority Research Symposium. Nov. 1999. Crowne Plaza, Phoenix, AZ

BORJA, M, HARRIS, M and MASON, A.Z. Cu Turnover in Cytosolic Proteins of *Littorina littorea* by Stable Isotopic Ratio Analysis and coupled HPLC/ICP-MS. (1999) Annual SCUR (Southern California Undergraduate Research) Conference. November 20, 1999. Loyola Marymount University, Los Angeles, CA.

BORJA, M, HARRIS, M and MASON, A.Z. Cu Turnover in the Visceral Complex of *Littorina littorea* by Stable Isotopic Dilution Analysis and coupled HPLC/ICP-MS. 80th Annual Western Society of Naturalist Meeting. Dec. 26-29, 1999. Marriot, Monterey, CA.

BORJA, M, HARRIS, M and MASON, A.Z. Cu Turnover in the Visceral Complex of *Littorina littorea* by Stable Isotopic Dilution Analysis and coupled HPLC/ICP-MS. 25th Annual WCBSUR (West Coast Biological Sciences Undergraduate Research) Conference April 29, 2000. Point Loma Nazarene University, San Diego, CA

BORJA, M. Cu analyses by Stable Isotopic Dilution Analysis and coupled HPLC/ICP-MS. CSULB Student Research Competition, March, 2000. CSU Long Beach.

HARRIS, M and MASON, A.Z. Preparation of Apo-metallothionein for use in metal turnover analysis. National Minority Research Symposium Nov 8-11 Washington D.C. 2000.

HUYN, H., LLOYD, D. and MASON, A.Z. Synthesis and Molecular Analysis of Apo-alkaline Phosphatase; a Putative Substrate for Metallothionein. SCUR (Southern California Undergraduate Research Symposium). Nov. 18, 2000. CSULB.

LLOYD, D. and MASON, A.Z. The Separation, Identification and Molecular Analysis of Complex Mixtures of Metalloproteins and Polypeptides by Tandemly Linked 2D HPLC-ICPMS. 24 Aug. 2000. SCUR (Southern California Undergraduate Research Symposium)Nov. 18, 2000.

MOELLER, R. and MASON, A.Z. Quantification of Reduced Glutathione and Glutathione Disulphide using glutathione Reductase and 2-Vinylpyridine. SCUR (Southern California Undergraduate Research Symposium). Nov. 18, 2000. CSULB

BORJA, M, THRIFFLETON, K.A. and MASON, A.Z. Purification, Isolation and Molecular Analysis of Apo-hemocyanin from the Garden Snail *Helix aspersa*, using Potassium Cyanide and Coupled HPLC/ICPMS. National Minority Research Symposium Nov 8-11 Washington D.C. 2000. Huynh, H.,

BORJA, M. R. and MASON, A.Z. The Use of Stable Isotopic Copper Ratio Analyses for Monitoring Cu fluxes in Proteins. 24 Aug. 2000. SAS student Research Symposium, CSULB.

TORRES, R., ADESINA, B., AKHAVE, M. and MASON, A.Z. The Effect of Tributyl Tin (TBT) on Glutathione-S-Transferase (GST) of the Common Garden Snail, *Helix aspersa*. 24 Aug. 2000. SAS student Research Symposium, CSULB.

STUDENT AWARDS:

Gully, J. (1991). First Place CSU Student Research Competition, CSU Hayward.

Sugar, M. (1991). First Prize (\$10,000 award) National High School Science Fair. Awarded by President G. Bush.

Layne, J. (1994). Best Student Oral Presentation and Paper. 3rd CSU EM Colloquium.

Borja, M. (1996). First Prize in Marine Biology (\$10,000 award) California High School Science Fair.

Valencia, R. (1998) Southern California Academy of Sciences ARCO Environmental Science Award for best student Paper.

Meraz, R. (1998). Plenary presentation at the National Minority Student Symposium, New York, Nov. 1998.

Meraz, R. (1999). An ICP-MS Study of Copper Metabolism in the Marine Prosobranch *Littorina littorea*. (CSU Research Competition. Placed 1st, Science and Engineering).

Francis, S. (1999). Kinetics of Copper Metabolism in *Littorina littorea*: A Study using Stable Isotopic Ratio Analysis (CSU Research Competition. Placed 2nd, Science and Engineering).

Jarvis, E. (2000). Mercury bioaccumulation with age in kelp bass, *Paralabrax clathratus*, caught near the isthmus at Santa Catalina Island, CA. Second Place, CSU 14th Annual Student Research Competition, California State Polytechnic University, Pomona, May 5th 2000.

Borja, M. April 29th 2000. Best Student presentation 25th Annual WCBSUR (West Coast Biological Sciences Undergraduate Research) Conference April 29, 2000. Point Loma Nazarene University, San Diego, CA.

Huynh, H. McNair Scholarship 1999-2000.

EXTERNAL GRANTS AND CONTRACTS:

- 1) Antibacterial coatings for endoprosthetic implants. Johnson Matthey Research/Scientific Engineering Research Council/National Research and Development Agency; to Institute of Orthopaedics, Univ. London. June 1983-June 1985. (\$120,000)
- 2) An *in vivo* study of a novel bactericidal coating in man. Johnson Matthey Research/National Research and Development Agency; to Institute of Orthopaedics. Univ. London. July 1985-Feb. 1986. (\$35,000)
- 3) SEM and energy dispersive X-ray microanalysis of fractured orthopaedic components. H. Stangers; to Institute of Orthopaedics. Univ. London. Feb. 1984-Oct. 1985 (\$30,000).
- 4) Metal metabolism and adaptation in the polychaete, *Neanthesarenaceodontata*. Department of Energy; to Molecular Ecology Institute. California State University Long Beach. July 1986-June 1987 (\$510,310).
- 5) Bioavailability, metabolism and toxicity of barium and related metals. Environmental Protection Agency; to Molecular Ecology Institute. California State University Long Beach. May 1987-May 1989 (\$281,885).
- 6) Determination of metal levels in sediments by inductively coupled plasma mass spectroscopy. CBM Bioventures; to Molecular Ecology Institute. California State University Long Beach. March 1988 \$75,000.
- 7) Processes of metal selection and rejection by metal accumulating cells. National Institute of Health; to

Department of Biological Sciences. California State University Long Beach. May 1988-May 1990
\$65,000.

8) Instrumentation grant for the purchase of a transmission electron microscope; to National Science Foundation Biological Instrumentation program; to School of Natural Sciences, California State University Long Beach. Awarded April 89. \$183,572.

9) Mechanisms of metal accumulation by cells. MBRS Program, NIEHS; to School of Natural Sciences, California State University Long Beach. 1989-1998. \$35,000.per annum

10) ICPMS study of Cd induced alterations in Cu metabolism. National Institute of Health; to Department of Biological Sciences. California State University Long Beach. June 1993-June 1997. \$101,407.

11) Food web structure and heavy metal accumulation in a recently established guild of Breeding Seabirds in Southern California; to Department of Biological Sciences. Co-PI with Horn, M and Collins, C. SeaGrant: Awarded to California State University Fullerton. 1996-1999. \$134,000

12) Evaluation of the toxicity of ingested Cu and W/Bi/Sn pellets by the California Condor. U.S. Fish and Wildlife. \$30,000

13) The Development of Sequentially Coupled Size Exclusion-ion exchange HPLC-ICP/MS for studying Metal Toxicity. \$5,000. Minigrant. Awarded Spring 1999.

14) NSF (MRI). Acquisition of an ICP-MS 1999-2000. \$238,886.

15) NSF (CRUI) Quantification of metal transfer from metallothionein to apo-metalloproteins using voltammetry on-line with HPLC/ICP-MS. 1999-2003 \$1,036,219

16) CSUPERB Initiative Grant. Software and hardware for a direct Injection Nebulization System for an ICP-MS. \$14,000.

17) MARC Supplement Program for Communications technology. Co-PI with Bauer, R and Lopez, M. \$234,350

17) Howard Hughes Medical Institute Proposal for the Development of Honors in the Biological Sciences Program at CSULB. May 2000
Co-PI with Drs Merryfield, Archie, Kingsford, Lopez, McAbee and Wijte. \$1,600,000.

18) NIH MBRS Score Proposal. Subproject: Tributyl Tin Induced Perturbations in Steroid Hormone Metabolism. \$671,719 (Pending).

INTERNAL GRANTS:

i) A technique for studying the kinetics of copper metabolism in cells using stable isotopic ratio analysis by inductively coupled plasma mass spectroscopy. Scholarly and Creative Activity Committee 1989-1990. Awarded \$3000.

- ii) Directly coupled ion chromatography inductively coupled plasma mass spectroscopy for the simultaneous separation and quantification of cationic species in natural waters. Minigrant Program; Awarded Dec. 1989 \$5,000.
 - iii) ICPMS study of stable 63/65 Cu fluxes through cells using isotope ratio analysis. Scholarly and Creative Activity Committee Spring 1990. Submitted 2nd Feb 1990; Funded May 10 1990; 3WTU, \$1400.
 - iv) Generation of an Invertebrate Genomic DNA Library for gene isolation and identification. Summer Stipend. submitted 15th October 1990.
 - v) Isolation and sequencing of the metallothionein gene. Scholarly and Creative Activity Committee. Submitted 2nd Feb 1991; Awarded August 19 1991; 3WTU.
 - vi) SCAC proposal The Development of technologies for Coupling Reverse Phase Chromatography Systems to an ICP-MS for Studying Metal Homeostasis and Toxicity. Class A Summer Stipend. Awarded December 10th 1999.
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UNIVERSITY SERVICE:

Departmental Committees:

- i) Department Curriculum Committee. 1990-1993
- ii) Molecular Aspects of Biological Sciences (MABS) Group. 1993
- iii) Grades Appeals Committee. 1993
- iv) Chair: Core Curriculum Development Committee. 1993
- v) Genetics Hiring Committee. 1993-1994
- vi) Retention, Tenure and Promotion Committee. 1993-1994
- vii) Retention, Tenure and Promotion Committee. 1994-1995
- viii) Chair, Comparative Physiologist Hiring Committee. 1994-1995
- ix) Group Leader: Cellular and Molecular group. 1993-1997
- x) Department Executive Council 1995, 1996, 1997.
- xi) Introductory Biology Development Committee. 1994
- xii) Chair: Department Seminar Committee 1996-97
- xiii) Immunology Hiring Committee 1997-1998
- xiv) Ichthyology Hiring Committee 1997-1998
- xv) Chair, Immunology Hiring Committee 1998-1999
- xvi) Group Leader: Marine Group 1997-1998.
- xvii) Departmental Chair Nominating Committee 1997.
- xviii) Departmental Self Study Committee. 1998
- xix) Chair, Grade Appeals Committee 1999-2000.
- xx) Wetlands Plant Ecology Hiring Committee 2000.

College Committees:

- i) ITSC Committee. 1998-2000

- ii) MBRS Advisory Group: 1996-Present
- iii) Director, College Electron Microscopy Facility: 1992-1999.
- iv) Director, Mass Spectroscopy Core Facility 1999-Present.

University Committees:

- i) University Radiation Safety Committee: 1988-1997
- ii) University Animal Welfare Committee: Member 1996-1998
- iii) Chair, Animal Welfare Board: 1998-1999
- iv) University GE Reform Workshop Committee. 1997
- v) University Peer Panel for Faculty Disputes: 1997-1999
- vi) University Academic Integrity Committee: 1997-1999
- vii) Baseline Allocation Technical Services Committee. 1998-1999
- viii) Academic Senate Ad-Hoc Committee on Scholarly Activity: 1999.
- ix) Chair, Associate Vice President for Graduate Studies and Research Hiring Committee: 2000-2001.