

CURRICULUM VITAE DOUGLAS E. CHANDLER

EDUCATION

B.S. in Chemistry, University of Rochester	1963-1967
M.A. in Biochemistry, Johns Hopkins School of Medicine	1967-1969
Graduate Program at NIH (non-degree program)	1969-1972
Ph.D. in Physiology, University of California, San Francisco	1973-1977
Postdoctoral Fellow, University of California, San Francisco	1977-1979
Postdoctoral Fellow, University College School of Medicine, London, ENGLAND	1979-1980

AREAS OF SPECIALIZATION

Fertilization: Biological activities of the egg extracellular matrix; sperm activation and chemotaxis; sperm binding to extracellular coats and modification of coats in echinoderm and amphibian eggs during fertilization; structure and role of embryonic extracellular matrices.

Bioimaging: Transmission electron microscopy; freeze fracture and platinum shadowing of cells, organelles and molecules; ultrarapid freezing of biological specimens for microscopy; laser confocal microscopy; video microscopy, atomic force microscopy.

POSITIONS HELD

Assistant Professor, Arizona State University	1980-1985
Visiting Scholar, University of California, San Diego	1985-1986
NIH Research Career Development Awardee	1985-1990
Associate Professor, Arizona State University	1985-1990
Member, Editorial Board, Journal of Electron Microscopy Technique	1990-2002
Professor of Biology, Arizona State University	1990-
Director, W.M. Keck Bioimaging Laboratory	1997-
Member, NIH Scientific Review Panel	2001-2004
Faculty Leader, Cellular and Molecular Biosciences	2003-2007
Interim Faculty Leader, Cellular and Molecular Biosciences	2012-2012

PROFESSIONAL ACTIVITIES

Organizer, Conference on Cryogenic Techniques in Biological Electron Microscopy, Arizona State University, October 12th and 13th, 1987

Organizer, Special Interest Subgroup Meeting on The Role of the Extracellular Matrix and Cell-Cell Interactions in Fertilization and Early Development, American Society for Cell Biology Meeting, San Francisco, January 29, 1989

Co-Organizer, Forum on Modeling, Visualization, and Imaging, Arizona State University, 1997.

Co-organizer, Tontozona Cell and Molecular Biology Conference (1988-2003)
Guest Editor, Journal of Electron Microscopy Technique, for the Ultrastructure of Development series (1988-1994).
Reviewer of NIH, NSF, and Seagrant grant applications.
Member of NIH Site Visit Team, Instrumentation Review Panel, 1990
Reviewer of manuscripts for journals (Life Sciences, Developmental Biology, Nature, Journal of Cell Biology, Journal of Biological Chemistry, American Journal of Physiology, Laboratory Investigation, Proc. Natl. Acad. Sci. U.S.A., European Journal of Cell Biology, Molecular Membrane Biology, Molecular Reproduction and Development, Biochim. Biophys. Acta, Biological Bulletin, Journal of Structural Biology, Journal of Cell Science, Microscopy Research and Technique, Biology of Reproduction, Biological Bulletin).
Reviewer of Cell Biology Textbooks
Member, Society for Developmental Biology, Arizona Imaging and Microanalysis Society, and Society for the Study of Reproduction.

PAST GRANT SUPPORT

NSF; Total Cost \$400,000; Period: September 1, 2006 - August 31, 2011; Title: Activity, Structure and Evolution of a Sperm Chemoattractant; PD with two others; % effort = 20%.

NSF; Total Cost \$400,000; Period: June 1, 2002 - August 31, 2006; Title: Characterization of a Vertebrate Sperm Chemoattractant; PD with 3 others; % effort = 20%

NSF; Total Cost \$499,194; Title: Acquisition of a Field-Emission, Controlled Temperature Environmental Scanning Electron Microscope; Co-PI with 14 others; % effort = not specified.

NSF; Total Cost \$360,000; Period: September 1, 1998 - August 31, 2002; Title: Isolation and Characterization of Sperm Activating Proteins from Xenopus Egg Jelly; Co-PI with 1 other; % effort = 20.

W.M. Keck Foundation; Total Cost: \$750,000; Period: Jan 1, 1997 - Dec 31, 2002; Title: The W.M. Keck Bioimaging Laboratory: An Interdisciplinary Facility for Studying Cells Interacting with Their Environment; PD with 20 others; % effort = not specified

ASU; Matching Funds for the W.M. Keck Bioimaging Laboratory; Approx. \$170,000 first year

ASU; Total Cost: \$ 150,000; Period: Jan 1, 1996 - Dec 31, 1999; Title: Engineering of Novel Biomaterials, Biointerfaces, and Biomedical Devices; Co-PI with 12 others; % effort = not specified.

ASU; Research Incentive Award; Total Cost: \$8,000; Period: Feb 1, 1998 - Jan 31, 1999; Title: Isolation and Characterization of Sperm Activating Proteins from Xenopus Egg Jelly, Co-PI with 1 other; % effort = not specified.

ASU; Research Incentive Award; Total Cost: \$8,000; Period: Feb 1, 1998 - Jan 31, 1999; Title: Sperm/Egg Extracellular Matrix Interaction During Fertilization; PI; % effort = not specified.

NSF; Total Cost: \$145,215; Period: April 1, 1994 - March 31, 1996; Title: Cryoinstrumentation for Electron Microscopy; Co-PI with 5 others.
% Effort = not specified.

NSF; Total Cost: \$180,000; Period: April 15, 1992 - March 31, 1995;
Title: The Role of the Extracellular Matrix in Early Development; PI: Douglas E. Chandler; % Effort = 50.

NSF; Total Cost: \$240,000; Period: February 1, 1989 - July 31, 1992;
Title: Ultrastructural Modification of Egg Coats at Fertilization; PI: Douglas E. Chandler;
% Effort = 50.

ASU; Matching Funds; Amount: \$ 2,095; Purpose: Purchase of Secondary Electron Detector;
Period: March 15, 1989 - June 31, 1989; PI (with other CoPIs): Douglas E. Chandler.

NIH; Total Cost: \$191,000; Period: April 1, 1988 - March 31, 1989; Title: Purchase of a Biomedical Electron Microscope; PI (with 6 CoPIs): Douglas E. Chandler; % Effort = 0.

ASU; Matching Funds; Amount: \$ 218,159; Period: April 1, 1988 - March 31, 1989; Purpose: Purchase of a Biomedical Electron Microscope; PI (with 6 CoPIs): Douglas E. Chandler; % Effort unspecified.

ASU; Biomedical Research Support Grant; Total Cost: \$7,500; Period: December 1, 1987 - March 31, 1988; Title: The Role of Protein Kinase C-mediated Phosphorylation During Fertilization; PI: Douglas E. Chandler; % Effort unspecified.

ASU; Conference Support; Amount: \$2,600; Period: August to November, 1987; Title: Cryogenic Techniques in Biological Electron Microscopy; Co-PI: Douglas E. Chandler and David Capco; % Effort unspecified.

Private Industry; Conference Support; Amount: \$1900; Period: August to November, 1987; Title: Cryogenic Techniques in Biological Electron Microscopy; Co-PIs: Douglas E. Chandler and David Capco; % Effort unspecified.

NIH; Total Cost: \$260,000; Period: January 1, 1985 - December 31, 1989;
Title: Structural Modification of Egg Coats During Fertilization/Research Career Development Award; PI: Douglas E. Chandler; % Effort = 100.

NSF; Total Cost: \$227,000; Period: November 15, 1984 - January 31, 1989; Title: Structural Modification of Egg Coats During Fertilization; PI: Douglas E. Chandler; % Effort = 25.

ASU; Request for a Research Assistant; Amount: approx. \$11,000; Period, 1983-1985; Purpose:

Freeze Fracture Studies of Mammalian Fertilization.

ASU; Biomedical Research Support Grant; Total Costs: \$4,500; Period: April 1, 1984 - March 31, 1985; Title: Ca²⁺-initiated Exocytosis in Sea Urchin Eggs; PI: Douglas E. Chandler; % Effort - unspecified.

ASU; Matching Funds; amount: \$39,496; Period: March 15, 1982 - March 31, 1983; Purpose: Acquisition of a Freeze Fracture Unit; PI: Douglas E. Chandler, % Effort 0%

NSF; Direct Costs: \$38,000; Period: March 15, 1982 - March 31, 1983; Title: Acquisition of a Freeze Fracture Unit; PI: Douglas E. Chandler; % Effort = 0.

NSF; Total Costs: \$180,000; Period: August 15, 1981 - July 31, 1985; Title: The Role of Calcium in Lysosomal Enzyme Secretion by Neutrophils; PI: Douglas E. Chandler; % Effort = 17.

Biomedical Research Support Grant, Arizona State University; amount: \$3,300; Period: March 31, 1981 - March 31, 1982; Title: Ca²⁺ and Chemotactic activation of neutrophils; PI: Douglas E. Chandler; % Effort: unspecified.

Faculty Grant-in-Aid, Arizona State University; amount: \$3,000; Period: January 1, 1981 - December 31, 1981; Title: Ca²⁺ and Neutrophil Chemotaxis; PI: Douglas E. Chandler; % Effort: unspecified.

GRADUATE STUDENTS MENTORED

<u>Student</u>	<u>Thesis/Dissertation Title</u>
	<u>Year</u> <u>Graduated</u>
	<u>Placement</u>
Carolyn Larabell	Structural Reorganization of Ph.D. 1988 Professor, Univ. of San Francisco
Calif., Xenopus laevis Eggs	
Carrie Merkle	Cortical Granule Exocytosis

			Ph.D. 1990 Assoc. Prof.
	In Sea Urchin Eggs		Univ. of AZ
Nancy Mozingo	Remodeling of the Sea Urchin Extracellular Matrix	Ph.D. 1993	Assist. Prof.
			Calif.S tate University, Channel Islands
Barry Bonnell			Charac terization of Egg Jelly Ph.D. 1995 Visitin g Prof.
	Coats		Univ. of Pittsburgh
Charles Kazilek			Principles and Techniques of MNS 1992 Acade micProf.
	Scientific Data Presentation		Arizon a State

			Univer sity
Bader Al-Anzi			Sperm Chemoattracta nt Activity M.S. 1998 Postdo ctoral Fellow, Cal Tech Senior
John Olson Lecturer,	Isolation of a Vertebrate Sperm Chemoattractant	Ph.D. 2005	Arizon a State University.
Xueyu Xiang		Cloning and Expression of Ph.D. 2004 Postdoctoral Allurin, a 21 kD sperm chemo- Fellow, U of A attractant from Xenopus laevis eggs.	
Amy Maio	on Sperm Motility		Effect of Arial Naturietic Peptide MNS 2004
Sumera Naqvi	Motility		Video Microscopy of Sperm MNS 2002
Lindsey Burnett	Crisp Proteins and Sperm Chemo- taxis: Discovery in Amphibians	Ph.D. 2008	Postdoctoral Fellow U.W; and Explorations

in Mammals

Medica
I student U. I.

Catherine Washburn Sperm Chemoattractant Activity
Of Allurin Peptide Surrogates

Ph.D. 2013 (anticipated)

SERVICE ON DEPARTMENTAL OR SCHOOL COMMITTEES

1980-81	Seminar Committee
1980-81	Graduate Student Review Committee
1981-82	Biology Curriculum Committee (Chairman)
1981-85	Electron Microscopy Committee
1981-82	Graduate Student Review Committee
1981-82	Ad Hoc Committee to prepare Self-Study Document
1982-83	Cell Biologist Search Committee (Chairman)
1982-84	Advisory Committee
1982-84	Graduate Admissions Committee
1983-84	Darkroom Committee (Chairman)
1983-85	Molecular Genetics Search Committee
1984-85	Curriculum Committee
1987-88	Ad Hoc Committee for Postdoctoral Fellow Search (Chairman)
1987-1997	Graduate Programs Committee
1988-89	Personnel Committee
1988-92	Life Sciences Building Committee (Chairman)
1990-91	Molecular Physiologist Search Committee
1990-1996	Personnel Committee (Chair, 1992-1993 and 1994-1996)
1994-1997	Ad hoc Committee on MCB Lab Design (Chair)
1995-1996	Ad hoc Committee on Biomedical Scientist Recruitment (Chair)
1996	Ad hoc Committee on Dev. Biologist Recruitment (Chair)
1996-1997	Developmental Biologist Search Committee
1997-1998	Personnel Committee
1998-2000	Advisory Committee
1998-2000	Search Committee for Scientist/Manager, W.M. Keck Laboratory (Chair)
2001-2003	Personnel Committee (Chair, 2002-2003)
2003-2007	Faculty Leader, Cellular and Molecular Biosciences Faculty, SOLS
2003-2007	Executive Committee, SOLS
2003-2007	Personnel Committee for Cellular and Molecular Biosciences, SOLS (Chair)
2003-2006	Search Committee for Faculty in Bioimaging, SOLS
2003-2005	Personnel Committee for Academic Professionals, SOLS
2004-2004	Search Committee for Physiology Lecturer, SOLS
2004-2005	Search Committee for Academic Professionals in Bioimaging, SOLS
2007-2013	Personnel Committee for Cellular and Molecular Biosciences, SOLS, Member
2012-2012	Interim Faculty Leader, Cellular and Molecular Biosciences Faculty, SOLS

SERVICE ON UNIVERSITY, COLLEGE, AND INTERDEPARTMENTAL COMMITTEES

1981-83	Committee for Review of Biomedical Research Support Grants
1983-84	Committee for Review of Faculty Grant-in-Aid Proposals
1983-84	Molecular and Cell Biology Committee (Chairman)
1984-85	Committee for Review of Biomedical Research Support Grants

1987-88 Committee on Biotechnology
 1987-92 Goldwater Center Design Subcommittee (Image Analysis Lab)
 1988-89 Electron Microscopist Search Committee
 1988-89 Search Committee, Zoology Chair
 1988-92 Users Committee, Life Sciences Building
 1989-90 Search Committee for Dean, CLAS
 1989-93 Committee for Degree Proposals in Molecular and Cellular Biology
 1991-92 Interdisciplinary Committee for Molecular and Cellular Biology (Chair)
 1992-93 Executive Committee, Molecular and Cellular Biology Program
 1992-93 Admissions Committee, Molecular and Cellular Biology Program (Chair)
 1992-1996 Comprehensive Exam Committee, MCB Program
 1994-1995 Graduate Council
 1994-2003 Advisory Committee, Goldwater Laboratories
 1995-1996 Search Committee, MCB Program Director
 1996-1997 Admissions Committee, MCB Program
 1996-1997 Ad Hoc Committee on Biomedicine and Health-Related Programs
 1987-2002 Tontozona Conference Organizing Committee
 1998-1999 Search Committee for CLAS Development Officer
 1998-1999 Internal Study Section for Institutional NSF Equipment Grants
 1998-2001 Seven Year Evaluation Committee, MCB Program (Chair)
 1999-2003 Executive Committee, MCB Program
 2000-2001 Search Committee, Molecular Tissue Engineer (Bioengineering)
 2001-2003 Comprehensive Exam Committee, MCB Program (Chair)
 2001-2003 Ad hoc Committee for Reorganization of MCB 555/556
 2006-2008 Working Committee for Biosciences and Technology Degree
 2008-2013 Executive Committee, Molecular and Cellular Biology Program
 2010-2013 CLAS RTS Advisory Committee for the Keck Bioimaging Laboratory (Chair)

TEACHING RESPONSIBILITIES

Instructor for undergraduate courses: General Biology (BIO 181H, 182), Cell Biology (BIO 353), Anatomy and Physiology (BIO 201, BIO 202), Animal Histology (BIO 453), Proseminar (BIO 498) in Cell Biology and Methods in Cell Biology, Internship (BIO 484), Special Problems and Techniques (BIO 310), and Honors Thesis (BIO 493). Instructor for graduate courses Biomembranes (BIO 551), Cell Biology of Secretory Cells (BIO 598), Advanced Molecular and Cellular Biology (MCB 555), Advanced Neurosciences (BIO 598), Readings and Conference (BIO 590), Seminar in Signal Transduction (BIO 591), Seminar in Cell and Developmental Biology (BIO 591), and Seminar in Bioimaging (BIO 591); Bioimaging: Current Techniques in Light and Electron Microscopy (BIO 504).

SEMINARS AND PRESENTATIONS SINCE 1992

February, 1992: Seminar Speaker, Department of Biological Sciences, Northern Arizona University, "Multiple intracellular signals coordinate reorganization of the sea urchin egg cortex at fertilization."

April, 1992: Invited Speaker, Workshop on Membrane Fusion, NIH, "Cytoskeletal changes in the sea urchin egg during hyperosmotic treatment and their effect on exocytosis."

May, 1992: Invited Speaker, Jacques Monod Conference, Aussios, France, "The role of osmotic forces in exocytosis."

October, 1992: Seminar Speaker, Department of Pharmacology, Cornell University, "The life history of an exocytic pore as seen by electron microscopy and electrophysiology."

November, 1992: Invited Speaker, International Workshop on Membrane Fusion: Approaches to Molecular Mechanisms in Biological and Model Systems, Kyoto, Japan, "Exocytic pores: their growth and life history as seen by electron microscopy."

April, 1993: Invited Speaker, First International Symposium on The Molecular and Cell Biology of Egg and Embryo Coats, Yokohama, Japan. "Structure, remodeling, and degradation of the sea urchin extracellular matrix during fertilization and embryogenesis as visualized by rapid-freezing and deep-etching."

May, 1993: Invited Speaker, International Symposium on Toxins and Exocytosis, Ljubljana, Slovenia. Invitation declined due to lack of travel funds.

January, 1994: Invited Speaker, Workshop on Imaging, University of Arizona, "Presentation of three dimensional electron microscopic images."

September, 1994: Invited Speaker, Ninth Symposium on Sea Urchin Development, Marine Biological Laboratories, Woods Hole, "The role of the extracellular matrix in development: recent advances using quick freezing and deep etching."

October, 1995: Invited Speaker, National Meeting of the Association of Biology Teachers, Phoenix, "Remodeling of the cell surface at fertilization."

April, 1997: Invited Speaker, Forum for Modeling, Visualization, and Imaging, Arizona State University, "Presentation of three dimensional images using electron and light microscopy."

May, 1997: Invited Speaker, Saturday Scholars Program, Arizona State University, "The Exciting World of Bioimaging."

May, 1997: Invited Speaker, Department of Human Anatomy, University of California, Davis, "Frog Egg Jelly: A Biologically Active Extracellular Matrix That Prepares Sperm for Fertilization."

September, 1997: Speaker, Biotechnology Forum, Arizona State University, "The role of egg extracellular matrices in amphibian fertilization."

October, 1997: Invited Speaker, 2nd International Symposium on the Cell and Molecular Biology of Egg and Embryo Coats, Sapporo, Japan, "Xenopus egg jelly is a biologically active extracellular matrix that prepares sperm for fertilization."

October, 1998: Speaker, Biotechnology Forum, Arizona State University, "The role of egg jelly in amphibian fertilization."

March, 2000: Invited Speaker, West Coast Regional Developmental Biology Conference, Bodega Bay, California, "The Egg Jelly Layers of the *Xenopus laevis* Extracellular Matrix Contain Sperm Chemoattractant and Fertilization-Promoting Proteins."

July, 2000: Poster Session, International Symposium on Cell-Cell Interaction. La Jolla,

California, "Purification of a Vertebrate Sperm Chemoattractant."

August, 2000: Invited Speaker, Third International Symposium On the Molecular and Cellular Biology of Egg and Embryo Coats, Lake Tahoe, CA, "Isolation, Purification and Characterization of a Vertebrate Sperm Chemoattractant from the Jelly of *Xenopus laevis* Eggs."

December, 2003: Invited Speaker, Fertilization SubGroup Session, National Meeting of the American Society for Cell Biology, San Francisco, "Allurin, a Sperm Chemoattractant Released from the Egg Jelly of *Xenopus laevis*."

November, 2004: Invited Speaker, Fourth International Symposium on the Molecular and Cellular Biology of Egg and Embryo Coats, Ise-Shima, Japan, "Allurin: the Life History of a Vertebrate Sperm Chemoattractant."

April, 2006: Invited Speaker, Titisee International Conference on Chemotaxis, Titisee, Germany, " Synthesis, release and actions of allurin, a 21 kD crisp family protein mediating chemotaxis in frog sperm."

October, 2006: Invited Speaker, MCB seminar, Arizona State University, Tempe, AZ. "Sperm Chemotaxis - or Why Men Like Perfume."

July, 2007: Invited Speaker, Gordon Research Conference on Fertilization and Activation of Development, Plymouth NH. "Sperm Chemotaxis mediated by Crisp Family Proteins."

November, 2012: Invited Speaker, Fifth International Symposium on the Molecular and Cellular Biology of Egg and Embryo Coats, Nagoya, Japan, "Allurin: Exploring the Activity of a Frog Sperm Chemo- attractant in Mammals."

November, 2012: Invited Speaker, Satellite Symposium: Mechanisms of Sexual Reproduction in Plants and Animals, University of Nagoya, Nagoya, Japan, "Sperm Chemoattracton in Frogs."

PUBLICATIONS

A. BOOKS:

1. Trelease, R. N., **D. E. Chandler**, S. R. Szarek, and J. Hazel. 1982. Biology 102 Laboratory Manual, Kendall/Hunt Publishing Co., Dubuque, Iowa.
2. **Chandler D.E.** and R.W. Roberson. 2009. Bioimaging: Current Concepts in Light and Electron Microscopy. Jones and Bartlett Publishers, Sudbury, MA. pp. 440.

B. PAPERS:

1. Cowan, M. J., **D. E. Chandler**, and S. L. Friess. 1973. Biochemical indexes accompanying functional decay of working muscle in hyperbaric helium-oxygen-carbon dioxide environments. *Toxicol. Appl. Pharmacol.* 27: 585-595.
2. **Chandler, D. E.**, and J. A. Williams. 1974. Pancreatic acinar cells: effects of lanthanum ions on amylase release and calcium ion fluxes. *J. Physiol. (Lond.)* 243: 831-846.
3. Williams, J. A., and **D. E. Chandler**. 1975. Ca^{++} and pancreatic amylase release. *Am. J. Physiol.* 228: 1729-1732.
4. **Chandler, D. E.**, and J. A. Williams. 1977. Intracellular uptake and amylase and lactate dehydrogenase releasing actions of the divalent cation ionophore A23187 in dissociated pancreatic acinar cells. *J. Membrane Biol.* 32: 201-230.
5. **Chandler, D. E.**, and J. A. Williams. 1977. Fluorescent probe detects redistribution of cell calcium during stimulus-secretion coupling. *Nature* 268: 659-660.
6. **Chandler, D. E.**, and J. A. Williams. 1978. Intracellular divalent cation release in pancreatic acinar cells during stimulus-secretion coupling. I. Use of chlorotetracycline as fluorescent probe. *J. Cell. Biol.* 76: 371-385.
7. **Chandler, D. E.**, and J. A. Williams. 1978. Intracellular divalent cation release in pancreatic acinar cells during stimulus-secretion coupling II. Subcellular localization of the fluorescent probe chlorotetracycline. *J. Cell Biol.* 76: 386-399.
8. **Chandler, D. E.** 1978. Control of pancreatic enzyme secretion: a critique on the role of calcium. *Life Sci.* 23: 323-334.
9. **Chandler, D. E.** 1979. Quick-freezing avoids specimen preparation artifacts in membrane fusion studies. In *Freeze Fracture: Methods, Artifacts, and Interpretations*, J. E. Rash and C. S. Hudson, eds., Raven Press, New York. pp. 81-87.
10. **Chandler, D. E.**, and J. Heuser. 1979. Membrane fusion during secretion: cortical granule

- exocytosis in sea urchin eggs as studied by quick-freezing and freeze fracture. *J. Cell Biol.* 83: 91-108.
11. **Chandler, D. E.**, and J. Heuser. 1980. The vitelline layer of the sea urchin egg and its modification during fertilization: A freeze fracture study using quick freezing and deep etching. *J. Cell Biol.* 84: 618-632.
 12. **Chandler, D. E.**, and J. Heuser. 1980. Arrest of membrane fusion events in mast cells by quick-freezing. *J. Cell Biol.* 86: 666-674.
 13. **Chandler, D. E.**, and J. Heuser. 1981. Rapid growth of microvilli during fertilization of the sea urchin egg: New views in eggs that have been quick-frozen, freeze fractured and deeply etched. *Dev. Biol.* 82: 393-400.
 14. **Chandler, D. E.**, J. Bennett, and B. Gomperts. 1983. Freeze fracture studies of chemotactic peptide induced exocytosis in neutrophils: Evidence for two patterns of secretory granule fusion. *J. Ultrastr. Res.* 82: 221-232.
 15. **Chandler, D. E.**, G. Meusel, E. Schumaker, and C. Stapleton. 1983. Enzyme secretion from rabbit neutrophils: the role of intracellular calcium release during chemotactic peptide activation. *Am. J. Physiol.* 245:C196- C202.
 16. Stapleton, C. L., R. Barnard, and **D. E. Chandler**. 1983. C5a-stimulated enzyme release from rabbit neutrophils: either intracellular or extracellular calcium can be used to trigger secretion. *Biochim. Biophys. Acta* 763: 225-230.
 17. **Chandler, D. E.** 1984. Exocytosis involves highly localized membrane fusions. *Biochem. Soc. Trans.* 12: 961-963.
 18. **Chandler, D. E.** 1984. Comparison of fixed and quick frozen sea urchin eggs: exocytosis is preceded by a local increase in membrane mobility. *J. Cell. Sci.* 72: 23-36.
 19. **Chandler, D. E.** 1984. Exocytosis in vitro: ultrastructure of the isolated sea urchin egg cortex as seen in platinum replicas. *J. Ultrastruct. Res.* 89: 198-211.
 20. Stapleton, C. L., L. L. Mills, and **D. E. Chandler**. 1985. Cortical granule exocytosis in sea urchin eggs is inhibited by drugs that alter intracellular calcium stores. *J. Exp. Zool.* 234: 289-299.
 21. **Chandler, D. E.** 1986. Rotary shadowing with platinum-carbon in biological electron microscopy: a review of methods and applications. *J. Elec. Microsc. Tech.* 3: 305-335.
 22. **Chandler, D. E.** and C. J. Kazilek. 1986. Chemotactic peptide-induced exocytosis in neutrophils: granule fusion patterns depend on the source of messenger calcium. *J. Cell Sci.* 83: 293-311.

23. **Chandler, D. E.**, and C. J. Kazilek. 1986. Extracellular coats on the surface of Strongylocentrotus purpuratus eggs: stereo electron microscopy of quick-frozen and deep-etched specimens. *Cell Tiss. Res.* 246: 153-161.
24. **Chandler, D. E.**, and C. J. Kazilek. 1987. Calcium signals in neutrophils can be divided into three distinct phases. *Biochim. Biophys. Acta* 931: 175-179.
25. **Chandler, D. E.**, and V. D. Vacquier. 1987. Phorbol myristate acetate induces the phosphorylation of plasma membrane-associated proteins in sea urchin eggs. *Develop. Growth Differ.* 30: 49-59.
26. Larabell, C. A., and **D. E. Chandler**. 1988. Freeze fracture analysis of structural reorganization during meiotic maturation in oocytes of Xenopus laevis. *Cell Tiss. Res.* 251: 129-136.
27. **Chandler, D. E.** 1988. Exocytosis and endocytosis: membrane fusion events captured in rapidly frozen cells. *Curr. Top. Membr. Trans.* 32: 169-202.
28. Kazilek, C. J., C. J. Merkle, and **D. E. Chandler**. 1988. Hyperosmotic media inhibit both exocytosis and the preceding calcium signal in formyl-peptide activated neutrophils. *Am. J. Physiol.* 254: C709-C718.
29. Larabell, C. A., and **D. E. Chandler**. 1988. The extracellular matrix of Xenopus laevis eggs: a quick-freeze, deep-etch analysis of its modification at fertilization. *J. Cell Biol.* 107: 731-741.
30. Larabell, C. A., and **D. E. Chandler**. 1988. In vitro formation of the "S" layer, a unique component of the fertilization envelope in Xenopus laevis eggs. *Dev. Biol.* 130: 356-364.
31. Larabell, C. A., and **D. E. Chandler**. 1989. The coelomic envelope of Xenopus laevis eggs: a quick-freeze, deep-etch analysis. *Dev. Biol.* 131: 126-135.
32. **Chandler, D. E.**, C. J. Merkle, and C. J. Kazilek. 1989. Detection of calcium signals in neutrophils using fluorescent dyes: hyperosmolality inhibits lysosomal enzyme release and the preceding rise in cytosolic free calcium. In: Fluorescence Spectroscopy: Biological, Hydrological, and Environmental Applications. M. C. Goldberg, ed., American Chemical Society, Symposium Series # 383, pp. 70-83.

33. Larabell, C. A., and **D. E. Chandler**. 1989. Quick-freeze, deep-etch, rotary-shadow views of the extracellular matrix and cortical cytoskeleton of Xenopus laevis eggs. *J. Elect. Microsc. Tech.* 13: 228-243.
34. Larabell, C. A., and **D. E. Chandler**. 1989. The vitelline layer and fertilization envelope of echinoderm and amphibian eggs: visualization of a cell surface-anchored extracellular matrix. In Freeze Fracture Studies of Membrane Structure, S. W. Hui, ed., CRC Press, Boca Raton. pp. 175-199.
- 35. Chandler, D. E.**, M. Whitaker, and J. Zimmerberg. 1989. Polymer solutions block cortical granule exocytosis at the level of granule matrix discharge. *J. Cell Biol.* 109: 1269-1278.
36. Merkle, C. J., and **D. E. Chandler**. 1989. Hyperosmolality blocks cortical granule exocytosis and produces cytoskeletal changes in the sea urchin egg cortex. *J. Membr. Biol.* 112: 223-232.
37. Bonnell, B., C. Larabell, and **D. E. Chandler**. 1990. The extracellular matrix of echinoderm and amphibian eggs: visualization in quick-frozen, deep-etched, and rotary-shadowed specimens. In Proceedings of the XII International Congress on Electron Microscopy, Vol. 1, San Francisco Press, San Francisco, pp. 60-61.
38. Larabell, C. A., and **D. E. Chandler**. 1990. Step-wise transformation of the vitelline envelope of Xenopus eggs at activation: a quick-freeze, deep-etch analysis. *Dev. Biol.* 139: 263-268.
39. Mazingo, N. M., and **D. E. Chandler**. 1990. The fluorescent probe BCECF has a heterogeneous distribution in sea urchin eggs. *Cell Biol. Int. Rep.* 14: 689-699.
40. Bonnell, B. S., and **D. E. Chandler**. 1990. Visualization of the Lytechinus pictus egg jelly coat in platinum replicas. *J. Struct. Biol.* 105: 123-132.
- 41. Chandler, D. E.** 1991. Multiple intracellular signals coordinate structural dynamics in the sea urchin egg cortex at fertilization. *J. Electr. Microsc. Tech.* 17: 266-293.
42. Larabell, C. A., and **D. E. Chandler**. 1991. Fertilization-induced changes in the vitelline envelope of echinoderm and amphibian eggs: self assembly of an extracellular matrix. *J. Electr. Microsc. Tech.* 17: 294-318.
43. Mazingo, N. M., and **D. E. Chandler**. 1991. Evidence for the existence of two assembly domains within the sea urchin fertilization envelope. *Dev. Biol.* 146: 148-157.
44. Merkle, C. J., and **D. E. Chandler**. 1991. Cortical granule matrix disassembly during exocytosis in sea urchin eggs. *Dev. Biol.* 148: 429-441.

45. **Chandler, D. E.** 1991. Membrane fusion as seen in rapidly frozen secretory cells. *Ann. N.Y. Acad. Sci.* 635: 234-245.
46. Mozingo, N. M., and **D. E. Chandler.** 1993. Ultrastructural changes during fertilization envelope assembly in *Lytechinus pictus* eggs revealed by quick-freeze, deep-etch electron microscopy. *Cell Tiss. Res.* 271: 271-277.
47. Curran, M., F. S. Cohen, **D. E. Chandler,** and J. Zimmerberg. 1993. Exocytotic fusion pores exhibit semi-stable states. *J. Membrane Biol.* 133: 61-75.
48. Mozingo, N. M., and **D. E. Chandler.** 1993. Degradation of an extracellular matrix: sea urchin hatching enzyme removes cortical granule-derived proteins from the fertilization envelope. *J. Cell Sci.* 104: 929-938.
49. Bonnell, B., C. A. Larabell, and **D. E. Chandler.** 1993. The sea urchin egg jelly coat is a three dimensional fibrous network as seen by intermediate voltage electron microscopy and deep etching analysis. *Mol. Reprod. Dev.* 35: 181-188.
50. Merkle, C. J., and **D. E. Chandler.** 1993. Visualization of exocytosis by quick-freezing and freeze fracture. In *Methods in Enzymology*, Vol. 221. Part B, N. Duzgunes, ed., Academic Press, Orlando, pp. 112-123.
51. Bonnell, B. S., S. Keller, V. D. Vacquier, and **D. E. Chandler.** 1994. The sea urchin egg jelly layer is constructed of globular proteins bound to a fibrous fucan network. *Dev. Biol.* 162:313-324.
52. Mozingo, N.M., C. Somers, and **D. E. Chandler.** 1994. Visualization of the ovoperoxidase-proteoliasin complex and its spatial organization within the *Strongylocentrotus purpuratus* fertilization envelope. *J. Cell Science* 107:2769-2777.
53. Mozingo, N. M., and **D. E. Chandler.** 1995. Events at the cell surface: exocytosis and remodelling of the extracellular matrix as seen in quick-frozen deep-etched cells. In "Rapid Freezing, Freeze Fracture and Deep Etching: The State of the Art," N. Severs and D. Shotten, eds., Wiley-Liss, New York. pp. 285-310.
54. Mozingo, N.M., V. D. Vacquier, and **D.E. Chandler.** 1995. Structural features of the abalone egg extracellular matrix and its role in gamete interaction during fertilization. *Molecular Reproduction and Development* 41:493-502.
55. Bonnell, B.S., Reinhart, D., and **D. E. Chandler.** 1996. *Xenopus laevis* egg jelly coats consist of small diffusible proteins bound to a complex system of structurally stable networks composed of high-molecular-weight glycoconjugates. *Dev. Biol.* 174:32-42.
56. Bonnell, B.S., and **D. E. Chandler.** 1996. Egg jelly layers of *Xenopus laevis* are unique in ultrastructure and sugar distribution. *Molecular Reproduction and Development* 44:212-

57. Roberson, R.W., and **D.E. Chandler**. 1997. Rapid-freezing and deep-etching of cells and molecules. In *Cell Biology: A Laboratory Manual*, D.L. Spector, R. Goldman, and L. Levinwand, eds., Cold Spring Harbor Press.
58. Al-Anzi, B., and **D.E. Chandler**. 1998. A sperm chemoattractant is released from *Xenopus* egg jelly during spawning. *Developmental Biology*. 198:366-375.
59. Reinhart, D., Ridgway, J., and **D.E. Chandler**. 1998. *Xenopus laevis* fertilization: analysis of sperm motility in egg jelly using video light microscopy. *Zygote*. 6:173-182.
60. Olson, J. H., and **D. E. Chandler**. 1999. *Xenopus laevis* egg jelly contains small proteins that are essential for fertilization. *Developmental Biology* 210:401-410.
61. Olson, J., Xiang, X., Ziegert, T., Kittelson, A., Rawls, A., Bieber, A., and **D.E. Chandler**. 2001. Allurin, a 21 kD sperm chemoattractant from *Xenopus* egg jelly, is homologous to mammalian sperm-binding proteins of the CRISP family. *Proc. Natl. Acad. Sci. USA* 98:11205-11210. (Cited in Science as the Signal Transduction paper of the week)
62. Sugiyama, H., Al-Anzi, B., McGaughey, R., and **D.E. Chandler**. 2004. Assays for vertebrate sperm chemotaxis. *Meth. Mol. Biol.* 253: 27-48.
63. Xiang, X., Burnett, L., Rawls, A., Bieber, A., and **D. E. Chandler**. 2004. The sperm chemoattractant "allurin" is expressed and secreted from the *Xenopus* oviduct in a hormone-dependent manner. *Dev. Biol.* 275:343-355.
64. Xiang, X., Kittelson, A., Olson, J., Bieber, A., and **D.E. Chandler** 2005. Allurin, a 21 kD sperm chemoattractant, is rapidly released from the outermost J3 jelly layer of the *Xenopus* Egg by diffusion and medium convection. *Mol. Reprod. Dev.* 70:344-360.
65. Burnett, L.A., Xiang, X., Bieber, A.L. and **D. E. Chandler** 2008. Crisp proteins and sperm chemotaxis: discovery in amphibians and explorations in mammals. *Int. J. Dev. Biol.* 52: 489-501.
66. Burnett, L.A., Boyles, S., Spencer, C., Bieber, A.L. and **D. E. Chandler**. 2008. *Xenopus tropicalis* allurin: expression, purification, and characterization of a sperm chemoattractant that exhibits cross-species activity. *Dev. Biol.* 316:408-16.
67. Sugiyama, H., Burnett, L.A., Xiang, X., Olson, J., Willis, S., Miao, A., Akema, T., Bieber, A.L., and **D.E. Chandler**. 2009. Purification and multimer formation of allurin, a sperm chemoattractant from *Xenopus laevis* egg jelly. *Mol. Reprod. Dev.* 76:527-536. (accompanied by journal cover)
68. Burnett, L., Anderson, D., Rawls, A., Bieber, A., and **D.E. Chandler**. 2011. Mouse sperm

- exhibit chemotaxis to allurin, a truncated member of the cysteine-rich secretory protein family. *Developmental Biology* 360:318-328.
69. Burnett, L., Sugiyama, H., Bieber, A., and **D.E. Chandler**. 2011. Egg jelly proteins stimulate directed motility in *Xenopus laevis* sperm. *Mol. Reprod. Dev.* 78:450-462. (accompanied by journal cover)
 70. Tholl, N., Boyles, S., McLaughlin, E., Bieber, A.L., and **D.E. Chandler**. 2011. Swimming of *Xenopus laevis* sperm exhibits multiple gears and its duration is extended by egg jelly constituents. *Biol. Bull.* 220:174-185.
 71. Burnett, L.A., Tholl, N., and **D.E. Chandler**. 2011. Two types of assays for detecting frog sperm chemoattraction. *Journal of Visualized Experiments* Issue 58:1-8, e3407, DOI :10.3791/3407.
 72. Burnett, L.A., Washburn, C.A., Sugiyama, H., Xiang, X., Olson, J.H., Al-Anzi, B., Bieber, A.L., and **D.E. Chandler**. 2012. Allurin, an amphibian sperm chemoattractant having implications for mammalian sperm physiology. *Int. Rev. Cell Mol. Biol.* 295:1-65.
 73. **Chandler, D.E.** and W.P. Sharp. 2013. Freeze Fracture and Freeze Etching. In: *Electron Microscopy: Methods and Protocols*, J. Kuo, editor, 3rd Edition, Springer Science + Business Media, In Press.
 74. Burnett, L.A., Sugiyama, H., Bieber, A.L. and **D.E. Chandler**. 2013. Allurin: exploring the activity of a frog sperm chemoattractant in mammals. In: *Mechanisms of Sexual Reproduction in Plants and Animals*, H. Sugiyama, editor, Springer Science + Business Media, In Press.
 75. Sugiyama, H. and **D.E. Chandler**. Sperm guidance to the egg finds calcium at the helm. *Protoplasma* Submitted.
 76. Burnett, L., Sugiyama, H., Xiang, X., **Chandler, D.**, and A.L. Bieber. Amino acid sequence and structure predictions for the sperm chemoattractant protein allurin. In Preparation.

C. EDITORIALS

1. **Chandler, D. E.** 1990. Preface. *Ultrastructure of development: gametogenesis.* *J. Electr. Microsc. Tech.* 16: 91.
2. **Chandler, D. E.** 1991. Preface. *Ultrastructure of development: fertilization.* *J. Electr. Microsc. Tech.* 17: 245.
3. **Chandler, D. E.** 1992. Introduction. *Ultrastructure of development: early cleavages and cell lineage.* *Microsc. Res. Tech.* 22: 1.

4. **Chandler, D. E.** 1993. Introduction. Ultrastructure of development: sculpting of the embryo: gastrulation and morphogenetic movements. *Microsc. Res. Tech.* 26:273.

D. ABSTRACTS:

1. **Chandler, D. E.**, and J. A. Williams. 1974. Effects of La^{3+} on pancreatic amylase secretion and $^{45}\text{Ca}^{2+}$ fluxes. *Fed. Proc.* 33: 409.
2. **Chandler, D. E.** 1976. Stimulus-secretion coupling in the exocrine pancreas: use of the fluorescent probe chlorotetracycline to detect divalent cation redistribution. *Fed. Proc.* 35: 603.
3. Williams, J. A., **D. E. Chandler**, and J. H. Poulson. 1976. Interactions of the Ca^{++} ionophore A23187 with pancreatic acinar cells. *J. Cell Biol.* 70: 221a.
4. **Chandler, D. E.**, and J. A. Williams. 1977. A fluorescent probe detects redistribution of intracellular calcium during pancreatic enzyme secretion. *J. Cell Biol.* 75: 365a.
5. **Chandler, D. E.**, and J. Heuser. 1978. Freeze fracture analysis of cortical granule exocytosis during sea urchin egg fertilization: formation of multiple pores which are glycerination artifacts. *J. Cell Biol.* 79: 238a.
6. **Chandler, D. E.**, and J. Heuser. 1979. Early stages of exocytosis in mast cells caught by quick-freezing and freeze fracture. *J. Cell Biol.* 83: 276a.
7. **Chandler, D. E.**, J. P. Bennett, and J. Heuser. 1980. Chemotactic peptide (FMLP)-induced exocytosis in neutrophils. A freeze fracture study. *Eur. J. Cell Biol.* 22: 182.
8. **Chandler, D. E.**, C. Stapleton, E. Schumaker, and G. Meusel. 1982. Chemotactic peptide (FMLP) stimulation of neutrophils involves release of intracellular calcium. *J. Cell Biol.* 95: 243a.
9. Stapleton, C. L., L. L. Mills, R. M. Barnard, and **D. E. Chandler**. 1983. Cortical granule exocytosis in sea urchin eggs is blocked by drugs that inhibit release of intracellular calcium. *J. Cell Biol.* 97: 29a.
10. **Chandler, D. E.** 1984. Ultrastructural studies of membrane fusion during exocytosis. Abstracts of the 608th Meeting of the Biochemical Society, Keele. Issued with *Biochem. Soc. Bulletin* 6(1):5.
11. **Chandler, D. E.** 1984. Exocytosis in the isolated sea urchin egg cortex as viewed by rotary platinum shadowing. *J. Cell Biol.* 99: 53a.

12. **Chandler, D. E.** 1985. The vitelline layer of the sea urchin egg: structural modifications during fertilization as seen in stereo electron micrographs of deep-etched, rotary-shadowed eggs. *J. Cell Biol.* 101: 229a.
13. **Chandler, D. E.** 1986. Phorbol myristate acetate [PMA] induces phosphorylation of plasma membrane proteins in sea urchin [*S. purpuratus*] eggs. *J. Cell Biol.* 103: 86a.
14. Larabell, C. A., and **Chandler, D. E.** 1986. Structural reorganization in the *Xenopus* oocyte during meiotic maturation as viewed by freeze fracture. *J. Cell Biol.* 103: 370a.
15. Kazilek, C. J., C. S. Merkle, and **D. E. Chandler.** 1987. Detection of calcium signals in neutrophils using fluorescent dyes: hyperosmolarity inhibits lysosomal enzyme release and the preceding rise in cytosolic free calcium. Abstracts of the American Chemical Society 193rd Natl. Meeting, Div. of Environmental Chem., Vol. 27(1), pg. 47.
16. Merkle, C. J., and **D. E. Chandler.** 1987. Hyperosmolality inhibits exocytosis and causes ultrastructural changes in sea urchin eggs. Program Notes, Conference on Cryogenic Techniques in Biological Electron Microscopy, Arizona State University, Oct 12 and 13th, 1987.
17. **Chandler, D. E.**, C. J. Merkle, and C. J. Kazilek. 1987. Signal transduction in neutrophils: the chemotactic peptide-generated calcium signal consists of three distinct phases. *J. Cell Biol.* 105: 13a.
18. Larabell, C. A., and **D. E. Chandler.** 1987. Conversion of vitelline envelope to fertilization envelope in eggs of the amphibian, *Xenopus laevis*: stereo electron microscopy of quick-frozen, deep-etched specimens. *J. Cell Biol.* 105: 254a.
19. Larabell, C. A., and **D. E. Chandler.** 1988. *In vitro* modification of the vitelline layer of *Xenopus laevis* eggs by cortical granule exudate. *FASEB* 2:A1017.
20. Larabell, C. A., and **D. E. Chandler.** 1988. The "S" layer, a unique component of the fertilization envelope, forms when *Xenopus laevis* eggs are incubated in cortical granule exudate: a quick-freeze, deep-etch analysis. *J. Cell Biol.* 107: 176a.
21. Kazilek, C. J., **D. E. Chandler**, and C. A. Larabell. 1988. A quick-freeze, deep-etch analysis of the extracellular matrix of *Xenopus laevis* oocytes before and after meiotic maturation. *J. Cell Biol.* 107: 819a.
22. **Chandler, D. E.**, M. Whitaker, and J. Zimmerberg. 1988. Cortical granule exocytosis is blocked by polymer solutions at the level of granule matrix disassembly. *J. Cell Biol.* 107: 340a.
23. Merkle, C. J., and **D. E. Chandler.** 1988. Hyperosmolality inhibits exocytosis and causes cytoskeletal changes in the sea urchin egg cortex. *J. Cell Biol.* 107: 340a.

24. Mazingo, N., and **D. E. Chandler**. 1989. The pH-sensitive signal of BCECF during sea urchin egg activation is complicated by heterogeneity in probe distribution. *J. Cell Biol.* 109: 126a.
25. Merkle, C. J., and **D. E. Chandler**. 1989. Hyperosmolality induces intracellular alkalization and formation of a filamentous network in the cortex of sea urchin eggs. *J. Cell Biol.* 109: 127a.
26. **Chandler, D. E.**, M. Curran, F. S. Cohen, and J. Zimmerberg. 1989. Exocytosis in mast cells is accompanied by dimpling of the plasma membrane and formation of small (<10 nm) pores. *J. Cell Biol.* 109: 300a.
27. Merkle, C. J., and **D. E. Chandler**. 1990. Cortical granule matrix disassembly during exocytosis in sea urchin eggs. *J. Cell Biol.* 111: 488a.
28. Mazingo, N. M., and **D. E. Chandler**. 1990. Assembly of the fertilization envelope in *S. purpuratus* eggs in the presence of inhibitors. *J. Cell Biol.* 111: 486a.
29. Bonnell, B., and **D. E. Chandler**. 1990. Visualization of the *Lytechinus pictus* egg jelly coat. *J. Cell Biol.* 111: 487a.
30. Mazingo, N. M., C. E. Somers and **D. E. Chandler**. 1991. Immuno-localization of proteoliasin and ovoperoxidase in the sea urchin fertilization envelope in quick-frozen, deep-etched specimens. *J. Cell Biol.* 115: 320a.
31. Mazingo, N. M., and **D. E. Chandler**. 1991. Assembly of the *Lytechinus pictus* fertilization envelope as seen in quick-frozen, deep-etched specimens. *J. Cell Biol.* 115: 322a.
32. Bonnell, B., and **D. E. Chandler**. 1991. Visualization of the intact egg jelly coat from the sea urchin *Lytechinus pictus* by LM, TEM, and SEM. *J. Cell Biol.* 115: 321a.
33. Mazingo, N. M., and **D. E. Chandler**. 1992. Assembly and degradation of the sea urchin fertilization envelope during early development. Program notes of the Southwestern Regional Meeting of the Society for Developmental Biology, Albuquerque.
34. Bonnell, B., and **D. E. Chandler**. 1992. Ultrastructural visualization of the intact sea urchin egg jelly coat. Program notes of the Southwestern Regional Meeting of the Society for Developmental Biology, Albuquerque.
35. Mazingo, N. M., C. E. Somers, and **D. E. Chandler**. 1992. Ultrastructure of proteoliasin and ovoperoxidase, two components of the sea urchin fertilization envelope. *Mol. Biol. Cell* 3:16a.
36. Mazingo, N. M., and **D. E. Chandler**. 1992. Ultrastructural changes in the sea urchin

- fertilization envelope during hatching. *Mol. Biol. Cell* 3:16a.
37. Bonnell, B., S. H. Keller, **D. E. Chandler**, and V. D. Vacquier. 1992. Visualization of macromolecular components of the egg jelly coat of the sea urchin *S. purpuratus*. *Mol. Biol. Cell* 3: 14a.
 - 38. Chandler, D. E.**, and C. J. Merkle. 1992. Exocytic pores: their growth and life history as seen by electron microscopy. Program notes of the International Workshop on "Membrane Fusion: Approaches to Molecular Mechanism in Biological and Model Membranes," Kyoto, Japan, November 8-12.
 39. Bonnell, B., N. M. Mazingo, and **D. E. Chandler**. 1993. Structure, remodeling, and degradation of the sea urchin egg extracellular matrix during fertilization and embryogenesis as visualized by rapid-freezing and deep-etching. *J. Reprod. Dev.* 39 (Suppl.): 79-80.
 40. Mazingo, N. M., and **D. E. Chandler**. 1993. The paracrystalline component of sea urchin envelopes: from fertilization to hatching. *J. Reprod. Dev.* 39(Suppl.): 138.
 41. Bonnell, B., and **D. Chandler**. 1993. Visualization of *Xenopus Laevis* jelly coat layers in platinum replicas. *Mol. Biol. Cell* 4:139a.
 42. Mazingo, N. M., and **D. E. Chandler**. 1993. Ultrastructure of the extracellular matrix surrounding abalone eggs. *Mol. Biol. Cell* 4:139a.
 43. Rosen, E.A., **D.E. Chandler**, C.C. Lambert, and R.A. Koch. 1994. Breaking disulfide bridges increases the rate of sea squirt egg hydration. *Mol. Biol. Cell* 5:94a.
 44. Bonnell, B.S., Reinhart, D., and **D. E. Chandler**. 1994. *Xenopus laevis* egg jelly consists of a fibrous glycoprotein matrix to which are bound globular proteins. *Mol. Biol. Cell* 5:223a.
 45. Reinhart, D., J. Ridgeway, A. Roth, and **D.E. Chandler**. 1996. Analysis of sperm motility in anuran egg jelly using video light microscopy. *Mol. Biol. Cell.* 7:482a.
 46. Al-Anzi, B., and **D.E. Chandler**. 1997. A chemoattractant is released from *Xenopus* egg jelly during spawning. *Mol. Biol. Cell.* 8:480a.
 47. Olson, J., Ridgeway, J., and **D.E. Chandler**. 1997. Fertilization is rescued by a factor in *Xenopus* egg jelly. *Mol. Biol. Cell* 8:480a.
 48. Olson, J., Al-Anzi, B., Ridgeway, J., Marzano, C., Roth, A., and **D.E. Chandler**. 1998. *Xenopus laevis* egg jelly: a biologically active extracellular matrix that prepares sperm for fertilization. *Zygote*. In Press.

49. Olson, J., Ziegert, T., Kittelson, A., Jung, T., Naqvi, S., Bieber, A., and **D.E. Chandler**. 2000. The jelly layers of *Xenopus laevis* extracellular matrix contain sperm chemoattractant and fertilization-promoting proteins. Program notes, West Coast Regional Developmental Biology Conference.
50. Olson, J., Ziegert, T., Kittelson, A., Jung, T., Naqvi, S., Bieber, A., and **D.E. Chandler**. 2000. The jelly layers of *Xenopus laevis* extracellular matrix contain sperm chemoattractant and fertilization-promoting proteins. Program Notes, International Symposium on Cell-Cell Interaction. pp. 12
51. Olson, J., Kittelson, A., Xiang, X., Simh, D., Ziegert, T., Bieber, A. and **D. E. Chandler**. 2000. A novel vertebrate sperm chemoattractant protein isolated from *Xenopus* egg jelly: molecular and biological properties. Program Notes, 3rd International Symposium on Molecular and Cellular Biology of Egg and Embryo Coats. p9.
52. Olson, J., Stone, K., Jung, T., Bieber, A. and **D. E. Chandler**. 2000. *Xenopus* egg jelly contains fertilization promoting proteins that may be involved in sperm-vitelline envelope binding. Program Notes, 3rd International Symposium on Molecular and Cellular Biology of Egg and Embryo Coats. p10.
53. Xiang, X., Olson, J., Johnson, J., Rawls, A., Bieber, A. and **D.E. Chandler**. 2001. Allurin, a 21 kD sperm chemoattractant from *Xenopus* egg jelly, is related to mammalian sperm-binding proteins of the CRISP family. *Dev. Biol.* 235:211.
54. Olson, J., Xiang, X., Kittelson, A., Stone, K., Simh, D., **Chandler, D.E.** and A. Bieber. 2001. Isolation of allurin, a 21 kD sperm chemoattractant protein from *Xenopus laevis* egg jelly: purification and characterization. *Dev. Biol.* 235 :212.
55. Naqvi, S., Kittelson, A., and **D.E. Chandler**. 2001. *Xenopus* sperm display three swimming patterns: ideal corkscrew, uncoupled corkscrew, and idle. *Dev. Biol.* 235:211.
56. Kittelson, A., Rawls, A., and **D. Chandler** and A. Bieber. 2002. Allurin, a *Xenopus* sperm chemoattractant: sequence confirmation and immunovisualization. *Dev. Biol.* 247:503.
57. Sugiyami, H., Rawls, A., Bieber, A., and **D. Chandler**. 2002. Expression and purification of recombinant allurin, a 21 kD sperm chemoattractant protein from *Xenopus laevis* egg jelly. *Dev. Biol.* 247:503.
58. Xiang, X., Rawls, A., and **D. E. Chandler**. 2002. Allurin, a 21 kD sperm chemoattractant protein from *Xenopus* egg jelly, is expressed in a hormone-dependent manner in the pars recta region of the *Xenopus* oviduct. *Dev. Biol.* 247:503.
59. Burnett, L., Xiang, X., and **D.E. Chandler**. 2003. Ultrastructural localization of allurin, a 21 kD sperm chemoattractant, in *X. laevis* oviduct. *Mol. Biol. Cell* 14:387a.

60. Sugiyama, H., Bieber, A.L., and **D.E. Chandler**. 2003. Recombinant allurin exhibits sperm chemoattractant activity. *Mol. Biol. Cell* 14:387a.
61. Miao, A. Q., Sugiyama, H., **Chandler, D.E.**, and A. Bieber. 2003. Identification of functional domains of allurin, a 21 kD vertebrate sperm chemoattractant, by site-directed mutagenesis. *Mol. Biol. Cell* 14:387a,
62. Xiang, X., Burnett, L., Sugiyama, H., Rawls, A., and **D.E. Chandler**. 2003. The sperm chemoattractant "allurin" is expressed and secreted from the *Xenopus* oviduct in a hormone-regulated manner. *Mol. Biol. Cell* 14:388a.
63. Burnett, L. A., Xiang, X., and **D.E. Chandler**. 2004. Ultrastructural characterization and localization of allurin, a 21 kD sperm chemoattractant, in *X. laevis* oviduct. Program Notes, Annual Meeting, Arizona Imaging and Microanalysis Society, Tempe, AZ. (Won Best Student Poster Award).
64. Xiang, X., Burnett, L., Sugiyama, H., Montierth, K. , Olson, J., Miao, A., Rawls, A. Bieber, A., and **D.E. Chandler**. 2004. Allurin: the life history of a vertebrate sperm chemoattractant from *X. laevis*. Program Notes, Fourth International Symposium on the Molecular Biology of Egg and Embryo Coats. p. 55.
65. Xiang, X., and **D.E. Chandler**. 2004. Allurin, a 21 kD sperm chemoattractant, is released from the outermost jelly layer of *X. laevis* by diffusion and convection. Program Notes, Fourth International Symposium on the Molecular Biology of Egg and Embryo Coats. p. 139.
66. Burnett, L.A., Montierth, K., and **D.E. Chandler**. 2004. Video microscopic observations of *Xenopus* sperm swimming in a chemoattractant gradient. Program Notes, Fourth International Symposium on the Molecular Biology of Egg and Embryo Coats. p. 138.
67. Sugiyama, H., Bieber, A., Akema, T. and **D.E. Chandler**. 2004. Recombinant allurin demonstrates sperm chemoattractant activity. Program Notes, Fourth International Symposium on the Molecular Biology of Egg and Embryo Coats. p. 140.
68. Burnett, L.A., Holburn, A., Bieber, A.L. and **D.E. Chandler**. 2005. Allurin binding to sperm as demonstrated by confocal microscopy. Program Notes, Annual Meeting, Arizona Imaging and Microanalysis Society, Tempe, AZ.
69. Burnett, L.A., Holburn, A., Bieber, A.L. and **D.E. Chandler**. 2005. Characterization of allurin-mediated sperm chemotaxis. *Mol. Biol. Cell* 16:513a. Abstracts, 45th ASCB Meeting, San Francisco. pp. 142a.
70. Burnett, L.A., Xiang, X., Sugiyama, H., Olson, J., Helmy, T., Holburn, A., Bieber, A.L. and **D.E. Chandler**. 2006. Synthesis, release and actions of allurin, a 21 kD crisp family protein mediating chemotaxis in frog sperm. Program Notes, International Titisee

Conference, Titisee, Germany, April, 2006.

71. Burnett, L.A., Bieber, A., and **D.E. Chandler**. 2006. Allurin, a sperm chemoattractant from amphibians, binds to mouse sperm and elicits chemotaxis in vitro. *Mol. Biol. Cell* 17:1192a. Abstracts, 46th annual ASCB Meeting, San Diego.
72. Burnett, L.A., Olson, J., Bieber, A. and **D.E. Chandler**. 2006. The sperm chemoattractant allurin: Unexpected deviations in the evolution of a CRISP family protein structure. *Mol. Biol. Cell* 17:1193a. Abstracts, 46th annual ASCB Meeting, San Diego.
73. Burnett, L.A., Bieber, A.L. and **D.E. Chandler**. 2007. Allurin, a *Xenopus* sperm chemoattractant, binds to mouse sperm and elicits chemotaxis in vitro. Program Notes, Gordon Conference on Fertilization and Activation of Development, Holderness School, NH.
74. Burnett, L.A., Boyles, S., Spencer, C., Bieber, A.L., and **D.E. Chandler**. 2007. Cross-species sperm chemoattraction and Crisp protein gene expression in *X. tropicalis*. *Mol. Biol. Cell* 18:2037a. Abstracts, 47th annual ASCB meeting, Washington, D.C.
75. Tholl, N., McLaughlin, E., Bieber, A.L. and **D.E. Chandler**. 2009. Egg jelly extract extends the motility lifetime of *X. laevis* sperm. Abstracts, 49th annual ASCB meeting, San Diego.
76. Washburn, C., Tubbs, K., Bieber, A.L., and **D.E. Chandler**. 2010. Analysis of CRISP proteins and peptide mimics in amphibian and mammalian systems. Abstracts, National meeting of the Protein Society, San Diego.
77. **Chandler, D.E.**, Washburn, C.A., and A.L. Bieber. 2011. Peptide mimics of the egg jelly protein allurin elicit chemoattractive behavior from frog sperm. Abstracts, National meeting of the Society for the Study of Reproduction, Portland, OR.
78. Washburn, C.A., Bieber, A.L., Tubbs, K. and **D.E. Chandler**. 2011. Mammalian sperm chemotaxis is elicited by peptide mimics of cysteine rich secretory proteins. Abstracts, National meeting of the Society for the Study of Reproduction, Portland, OR.
79. Tubbs, K.A., Bieber, A.L., Washburn, C.A. and **D.E. Chandler**. 2011. High-throughput epitope characterization of cancer-related biomarkers. Abstracts, National meeting of the Society for the Study of Reproduction, Portland, OR.
80. Burnett, L.A., Sugiyama, H., Bieber, A.L. and **D.E. Chandler**. 2012. Allurin: exploring the activity of a frog sperm chemoattractant in mammals. Abstracts, International Symposium on Sexual Reproduction in Plants and Animals, Nagoya, Japan.
81. Washburn, C.A., Bieber, A.L., Tubbs, K.A., and **D.E. Chandler**. 2012. Investigations of cysteine-rich secretory proteins and their peptide mimics in mammalian systems.

Abstracts, 60th Annual meeting of the American Society for Mass Spectroscopy,
Vancouver, B.C., Canada.