CURRICULUM VITAE

BIOGRAPHICAL

Name: Michael Bruce Butterworth

Business Address: Department of Cell Biology
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EDUCATION AND TRAINING

GRADUATE:

Dates	*Name and Location of Institution*	*Degree Received and Year*	*Major Subject*
1996-2002	University of Cape Town Cape Town, South Africa	PhD - 2002	Cell Biology
1996-2000	University of Cape Town Cape Town, South Africa	M.Sc. (upgraded to PhD)	
1994-1995	University of Cape Town Cape Town, South Africa	B.Sc (Med)(Hons). - 1995	Cell Biology

UNDERGRADUATE:

1991-1994	University of Cape Town Cape Town, South Africa	B.Sc. - 1994	Zoology

POSITIONS HELD

Years Inclusive	*Name and Location of Institution or Organization*	*Rank/title*
2009-present	University of Pittsburgh	Assistant Professor
2005-2009	University of Pittsburgh	Research Assistant Professor
2004-2005	University of Pittsburgh	Postdoctoral Scholar
2003-2004	University of Pittsburgh	Research Associate
2001-2003	University of Pittsburgh	Visiting Research Associate
1999	University of Cape Town	Research Associate

FUNDING

A) Current funding

Funding Agency	*Role*	*Project Title*	*Duration*	*Direct costs (p.a.)*
National Institutes of Health (R01) (DK102843)	PI	Role of microRNAs in kidney sodium regulation	2015-2020	$225 000
American Society of Nephrology	PI	Aldosterone-Regulated MicroRNAs and Sodium Transport in the Distal Kidney Nephron (2nd year forfeit for R01)	2014-2016	$100 000
AHA Pre-doctoral award	Mentor (Klemens student)	Ankyrin G Regulation of the Epithelial Sodium Channel after Aldosterone Stimulation	2015-2017	$26 000
NIH (T32) (DK091202)	Training Faculty (Bates PI)	Research Training in Pediatric Nephrology	2015-2020	$139 000

B) Previous funding

Funding Agency	*Role*	*Project Title*	*Duration*
Gilead Sciences	PI	Regulation of the epithelial sodium channel in the cystic fibrosis airway by Pseudomonas aeruginosa	2013-2015
NIH (NIDDK, K99/R00)	PI	ENaC regulation by vesicle trafficking and recycling	2008-2014
NIH (NIDDK) O'Brien Center Pilot	PI	Regulation of ENaC by miRNAs	2010-2012
NIH (NIDDK) R01-PI R.A. Frizzell	Co-investigator	Traffic Regulatory proteins & ENaC	2010-2013
Cystic Fibrosis Foundation	Principal Investigator (Research grant)	ENaC Regulation in Human Airway (2yrs renewed)	2006-2010
National Institutes Of Health (NIDDK)	Principal Investigator	Supplement to K99	2009-2010
National Institutes Of Health	Co-investigator (Center core)	Cystic Fibrosis Research Center	2006-2009
Cystic Fibrosis Foundation	Principal Investigator (Pilot project grant)	Cytokine Regulation of Lung ENaC via SGK	2005-2006

MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

Organization	*Year*
Salt and Water Club	2005-present
(Secretary)	2012-2015
American Physiological Society	2004-present
American Society of Nephrology	2011-present
American Heart Association	2012-present

AWARDS

Title of Award	*Year Awarded*
Carl W. Gottschalk Research Scholar Grant (ASN)	2014
Cell and Molecular Physiology New Investigator Award, American Physiological Society	2014
Gilead Sciences Research Scholars Program in Cystic Fibrosis	2012
Research Recognition Award, Renal Section APS, EB2012	2012
Transition to Independence Award (NIH, NIDDK, K99/R00)	2008
Ruth L. Kirschstein National Research Service Award (NIH Training Grant)	2004
Research Fellowship (Cystic Fibrosis Foundation USA)	2001
Research Fellowship (Cystic Fibrosis Foundation USA)	2000
National Research Foundation (South Africa) Doctoral Scholarship	1999
Experimental Biology Group Presentation Award	1999
Stella & Paul Loewenstein Trust Medical Research Scholarship	1999
Excellence in Renal Research Hoechst Marion Roussel Award (Predoctoral category, Experimental Biology '98, San Francisco)	1998
University of Cape Town Doctoral Travel Bursary	1998
Foundation for Research Development (South Africa) Doctoral Scholarship	1998
Life Science Microscopy Award (Microscopy Society of Southern Africa Conference)	1997
Foundation for Research Development (South Africa) Doctoral Scholarship	1997
Wyndham Award (Physiological Society of Southern Africa)	1996
Champion Bursary for undergraduate studies	1990-1994

PUBLICATIONS

A) Peer-Reviewed Articles:

1. Li, Y., Hu, H., **Butterworth, M.B.** and O'Neil, R.G. (2016). Expression of a Diverse Array of Ca2+-Activated K+ Channels (SK1/3, IK1, BK) that Functionally Couple to the Mechanosensitive TRPV4 Channel in the Collecting Duct System of Kidney. Resubmitted to *PLOS One*

2. Roy, A., Al-Qusairi, L., Donnelly, B.F., Ronzaud, C., Marciszyn, A., Gong, F., Chang, Y.P, **Butterworth, M.B.**, Pastor-Soler, N., Hallows, K.R., Staub, O. and Subramanya, A.R. (2015). Alternatively spliced proline-rich cassettes link WNK1 to aldosterone-dependent signaling cascades. *Journal of Clinical Investigation*. 125(9):3433-48

3. Edinger. R.S., Coronnello. C., Bodnar, A.J., Labarca M., Bhalla, V., LaFramboise, W.A., Benos, P.V., Ho, J., Johnson, J.P and **Butterworth, M.B.** (2014). Aldosterone regulates microRNAs in the CCD to alter sodium transport. *Journal of the American Society of Nephrology*. **25** (11):2445-57.

4. **Butterworth, M.B.**, Zhang, L and Thibodeau, P.H. (2014). Modulation of the Proteolytic Activation of the Epithelial Sodium Channel (ENaC) by a *Pseudomonas aeruginosa* Protease Inhibitor. *PLOS One*. 9(6):e100313.

5. Bertuccio, C.A., Lee, S-L., Wu, G., **Butterworth, M.B.**, Hamilton, K.L. and Devor, D.C. (2014). Anterograde trafficking of KCa3.1 in polarized epithelia is Rab1- and Rab8-dependent and recycling endosome-independent. *PLOS One*. **9** (3): e92013

6. Edinger, R.S., Bertrand, C.A, Rondandino, C., Apodaca, G.A., Johnson, J.P. and **Butterworth, M.B**. (2012). The epithelial sodium channel (ENaC) establishes a trafficking vesicle pool responsible for its regulation. *PLOS One.* **7** (9):e46593.

7. **Butterworth, M.B.**; Edinger, R.S.; Silvis, M.R.; Gallo, L.I.; Liang, X.; Apodaca, G.; Frizzell, R.A. and Johnson, J.P. (2012). Rab11b regulates the trafficking and recycling of the epithelium sodium channel (ENaC). *American Journal of Physiology – Renal.* **302**:F581-90.

8. Coronnello, C., Hartmaier, R., Arora, A., Huleihel, L., Pandit, K.V., Bais, A.S., **Butterworth, M.**, Kaminski, N., Stormo, G.D., Oesterreich, S., Benos, P.V. (2012). Novel Modeling of Combinatorial miRNA Targeting Identifies SNP with Potential Role in Bone Density. *PLOS Computational Biology*. **8** (12). e1002830.

9. **Butterworth M.B.**, Zhang L., Heidrich E., Myerburg M.M., Thibodeau P.H. (2012). Activation of the epithelial sodium channel (ENaC) by the alkaline protease from *Pseudomonas aeruginosa*. *Journal of Biological Chemistry.* **287**(39):32556-65.

10. Myerburg M.M., Harvey P.R., Heidrich E.M., Pilewski J.M., **Butterworth M.B.** (2010). Acute regulation of ENaC in airway epithelia by proteases and trafficking. *American Journal of Respiratory Cell and Molecular Biology*. **43(6):** 712-9.

11. Liang, X.; Peters, K.W.; **Butterworth, M.B.**, Frizzell, R.A. (2010). AS160 modulates aldosterone stimulated epithelial sodium channel (ENaC) forward trafficking. *Molecular Biology of the Cell*. **21(12):**2024-2033.

12. Hallows, K.R.; Edinger, R.S.; **Butterworth, M.B.**; Oyster, N.M.; Li, H.; Wang, H.; Buck, J.; Levin, L.R.; Johnson, J.P. and Pastor-Soler, N.M. (2009). Novel regulation of epithelial Na^+ transport by soluble adenylyl cyclase in kidney collecting duct cells. *Journal of Biological Chemistry.* **284(9):** 5774-83.

13. Silvis, M.R.; Bertrand, C.A.; Ameen, N.; Golin-Bisello, F.; **Butterworth, M.B.**, Frizzell, R.A. and Bradbury, N.A. (2009). Rab11b regulates the apical recycling of CFTR in polarized intestinal epithelial cells. *Molecular Biology of the Cell*. **20(8):** 2337-50

14. Liang, X.; **Butterworth, M.B.** ; Peters, K.W., Walker, W.H. and Frizzell, R.A. (2008). An obligatory heterodimer of 14-3-3β and 14-3-3ε is required for aldosterone regulation of the epithelial sodium channel. *Journal of Biological Chemistry.* **283:** 27418-27425

15. **Butterworth, M.B.**; Edinger, R.S.; Ovaa, H.; Johnson, J.P. and Frizzell, R.A. (2007). The deubiquitinating enzyme UCH-L3 regulates the apical membrane recycling of the epithelial sodium channel. *Journal of Biological Chemistry*. **282**:37885-93

16. Hill, W.G.; **Butterworth, M.B*.**; Wang, H. Edinger, R.S.; Frizzell, R.A. and Johnson, J.P. (2007). Lipid rafts mediate constitutive apical delivery of the epithelial sodium channel (ENaC). *Journal of Biological Chemistry*. **282**:37402-11 (*Co-first author)

17. Myerburg, M.M.; **Butterworth, M.B.**; McKenna, E.; Frizzell, R.A.; Kleyman,T.R. and Pilewski, J.M. (2006). Airway surface liquid depth regulates ENaC by altering the serine protease-protease inhibitor balance: A mechanism for sodium hyperabsorption in cystic fibrosis. *Journal of Biological Chemistry*. **281**: 27942-49

18. Liang, X.; Peters, K.W.; **Butterworth, M.B.** and Frizzell, R.A. (2006). 14-3-3 isoforms are induced by aldosterone and participate in its regulation of epithelial sodium channels. *Journal of Biological Chemistry*. **281**: 16323-32.

19. Wang, H.; Traub, L.; Weixel, K.; Shah, N.; Edinger, R.S.; Perry C.; Kleyman T.R.; **Butterworth M.B.**; Frizzell, R.A. and Johnson, J.P. (2006). Clathrin-associated endocytosis of ENaC: role of epsin. *Journal of Biological Chemistry*. **281**: 14129-35.

20. Zhang, H. ; Schmidt, B.Z.; Sun, F.; Condliffe, S.B.; **Butterworth, M.B.**; Youker, R.T.; Brodsky, J.L.; Aridor, M and Raymond A. Frizzell (2006). Cysteine string protein monitors late steps in CFTR biogenesis. *Journal of Biological Chemistry*. **281**: 11312-21.

21. **Butterworth, M.B.**; Frizzell, R.A.; Johnson, J.P; Peters, K.W. and Edinger, R.S. (2005). PKA-dependant ENaC trafficking requires the SNARE binding protein complexin. *American Journal of Physiology-Renal*. **285**(5):F969-977.

22. **Butterworth, M.B.**; Edinger, R.S.; Johnson, J.P and Frizzell, R.A. (2005). Acute ENaC regulation by cAMP in a kidney cell line is mediated by exocytic insertion from a recycling channel pool. *Journal of General Physiology*. **125**: 81-101.

23. Blazer-Yost, B.L.; **Butterworth, M.**; Hartman, A.; Parker, G.E.; Faletti, C.; Els, W.J. and Rhodes, S.J. (2001). Characterization of A6 cell clones expressing GFP-labeled ENaC subunits. *American Journal of Physiology-Cell Physiol*. **281**(2):C624-32.

24. **Butterworth, M.B.**; Helman, S.I. and Els, W.J.(2000). cAMP-sensitive endocytic trafficking in A6 epithelia. *American Journal of Physiology-Cell Physiol.* **280**(4): C752-C762.

25. Els, W.J. and **Butterworth, M.B.** (1998). The localisation of adenylate cyclase in membranes of cultured renal cells. *Journal of Microscopy Research & Technique* **40**:455-462.

B) Invited Reviews

1. **Butterworth, M.B.** (2015). MicroRNAs and the regulation of aldosterone signaling. *American Journal of Physiology-Cell Physiol*. **308(7):**C521-C527.

2. Thibodeau P.H. and **Butterworth M.B.** (2013). Proteases, Cystic Fibrosis and the Epithelial Sodium Channel (ENaC). *Cell & Tissue Research*. **351(2)**:309-23

3. **Butterworth, M.B.** (2010). Regulation of the epithelial sodium channel (ENaC) activity by membrane trafficking. *Biochim Biophys Acta – Molecular Basis for Disease*. **1802 (12):** 1166-77

4. **Butterworth, M.B.**; Edinger, R.S.; Frizzell, R.A. and Johnson, J.P. (2009). Regulation of the epithelial sodium channel (ENaC) by membrane trafficking. *American Journal of Physiology – Renal*. **296:** F10-F24

5. **Butterworth, M.B.**; Weisz, O.A. and Johnson, J.P. (2008). Some assembly required: Putting the epithelial sodium channel together. *Journal of Biological Chemistry*. **283(51):** 35305-9

C) Commentaries/Editorials

1. **Butterworth, M.B.** and Johnson, J.P (2008). USP10 the Nexus between Nexin and Vasopressin. *American Journal of Pysiology – Renal*. **295(4):** F888

D) Abstracts

Platform/Oral Presentations (Previous 5 years)

1. 2015 "Regulation of ENaC by Steroid Hormones". Molecular and Systems Integration of Genomic and Non-genomic Steroid Hormone Action. FASEB Science Research Conferences. Big Sky, MT.
2. 2015 "Regulation of ENaC by miRNAs". 8th International Symposium on Aldosterone, MR and Salt. Zermatt, Switzerland.
3. 2014 "MicroRNA-27 Is Upregulated by Aldosterone in the Kidney Distal Nephron Where It Facilitates the Regulation of ENaC-Mediated Sodium Transport". American Society of Nephrology Conference, Philadelphia, PA
4. 2013 "Aldosterone regulation of kidney microRNAs: A novel pathway in sodium regulation". Rapid Responses to Steroid Hormones 8th International Meeting, Erie, PA.
5. 2012 "The regulation of microRNAs by aldosterone: Impact on ENaC". Physiology 2012. The Physiological Society Meeting , Edinburgh, UK.
6. 2011 "MicroRNAs: Novel ENaC regulators" 7th International Symposium on Aldosterone and the ENaC/Degenerin Family of Ion Channels: Molecular Mechanisms and Pathophysiology, Asilomar, Pacific Grove, CA
7. 2011 "MicroRNAs in the Kidney: New Players in Epithelial Sodium Channel (ENaC) Regulation." Conference on Epithelial Cell Biology and Physiology. Telluride, CO.
8. 2011 "Aldosterone alters microRNA expression in mCCD cells to regulate ENaC activity" Experimental Biology, Washington DC.

Poster Presentations (Abstracts from previous 5 years)

1. **Butterworth, M.B**, Klemens, C.A. and Ho, J. (2015). MicroRNAs Are Essential Components of the Aldosterone-Mediated Regulation Of Sodium Transport In The Distal Kidney Nephron. World Congress of Nephrology. (SAT-431).
2. Klemens, C.A. and **Butterworth, M.B**. (2015). Anchors Aweigh: Ankyrin G Modulates the Epithelial Sodium Channel In Collecting Duct Epithelial Cells . World Congress of Nephrology. (SAT-060).
3. Klemens, C.A., Liu, X., Kightlinger, L. and Butterworth, M.B. (2014). Epithelial Sodium Channel Activity in the Distal Nephron Is Modified by the Aldosterone Induced Protein, Ankyrin G. American Society of Nephrology Conference PO027
4. Klemens, C.A., Carananati, M.E., Liu, X. and Butterworth, M.B. (2014). Cytoskeletal regulation of ENaC: the role of ankyrin G. *FASEB Journal*. 28:892.28

5. Butterworth, M.B., Liu, X and Edinger, R.S. (2014). A microRNA clustermiR-23~24~27 is regulated by aldosterone to alter Na^+ transport in the kidney distal nephron. *FASEB Journal*. 28:711.5
6. Butterworth, M.B., Liu, X and Edinger, R.S. (2014). Expression of intersectin 1/2 is repressed by aldosterone through microRNAs in the CCD to alter ENaC-mediated Na^+ transport. *FASEB Journal*. 28:893.4
7. Thibodeau, P.H.; Zhang, L. and Butterworth, M.B. (2013). A specific protease inhibitor from Pseudomonas aeruginosa prevents cleavage and activation of the epithelial sodium channel in human airway epithelia. *Pediatric Pulmonology*. S36:122.
8. Butterworth, M.B.; Zhang, L. and Thibodeau, P.H. (2013). Metalloprotease activation of the epithelial sodium channel. *Pediatric Pulmonology*. S36:161.
9. Klemens, C.A. Carananti, M.E., Liu, X. and Butterworth, M.B. (2013). Aldosterone Regulation of the Epithelial Sodium Channel via Ankyrin G. Rapid Responses to Steroid Hormones 8th International Meeting
10. Edinger, R.S., Butterworth, M.B. and Johnson, J.P. (2013). Active ENaC channels are selectively recycled. *FASEB Journal*. 27:911.10
11. Liu, X., Bertuccio, C., Devor, D and Butterworth, M.B (2013). Rab22 is involved in the regulation of the epithelial sodium channel. *FASEB Journal* 27:1148.5
12. Butterworth, M.B, Carananti, M. and Edinger, R.S. (2012). Ankyrin 3 is regulated by aldosterone and microRNAs, and alters ENaC-mediated sodium transport. *FASEB Journal*. 26:867.13
13. Edinger, R.S., Balasubramani, M., Schreiber, E. Butterworth, M.B and Johnson, J.P. (2011). Steroid regulation of the ENaC recycling pathway: a proteomic analysis. *FASEB Journal*. 25:840.14.
14. Le, A-T., Carananti, M.E., Liu, X. and Butterworth, M.B. (2011). Myosin 5 is involved in cAMP-induced ENaC trafficking in a mCCD cell line. *FASEB Journal*. 25:1041.40.
15. Winter, B.J., Balut, C.M., Butterworth, M.B., Gao, Y., Devor, D.C. and Hamilton, K.L. (2011). Basolateral trafficking of kCa3.1 in a polarized epithelium. *FASEB Journal*. 25:860.13.
16. Butterworth, M.B., Edinger, R.S., Garananti, M.E. LaFramboise, W.A. and Johnson, J.P. (2011). Aldosterone alters microRNA expression in mCCD cells to regulate ENaC activity. *FASEB Journal*. 25:1041.25.
17. Butterworth, M.B, Edinger, R.A., Bertrand, C.A., Frizzell, R.A. and Johnson, J.P. (2010) ENaC Expression Alters a Recycling Vesicle Pool Responsible for its Regulation. *FASEB Journal*. 24: 606.31.
18. Liang, X., Butterworth. M.B., Peters, K.W. and Frizzell, R.A. (2010). The Rab-GAP, AS160, participates in the regulation of the apical membrane epithelial sodium channel (ENaC) density and recycling. *FASEB Journal*. 24:1024.1

SERVICE

A) Invited Seminars

1. 2015 "Kidney microRNAs: Central players in sodium regulation or innocent bystanders?" Department of Human Biology, University of Cape Town, South Africa
2. 2015 "More than Just a Pinch of Salt: Regulation of Sodium Transport in the Kidney". Division of Nephrology, University of the Witwatersrand, South Africa.
3. 2013 "Regulation of the Epithelial Sodium Channel by microRNAs". Division of Nephrology, University of New Mexico School of Medicine.
4. 2012 "Regulation of the Epithelial Sodium Channel (ENaC): The Role of Protein Trafficking." Senior Vice Chancellor's Research Seminar 2012, University of Pittsburgh.
5. 2011 "Regulation of the Epithelial Sodium Channel (ENaC) : Do microRNAs add a new layer of complexity?" Department of Molecular and Integrative Physiology, School of Molecular and Cellular Biology, University of Illinois at Urbana-Champaign, Il.

6. 2011 "Altering microRNA Expression in Epithelial Cells: A novel Intermediary in the Regulation of Ion Channels" Division of Pulmonary, Allergy and Critical Care Medicine, University of Pittsburgh, Pittsburgh PA.
7. 2009 "Regulation of the Epithelial Sodium Channel by Trafficking and Recycling" Department of Physiology & Biophysics, Case Western Reserve University, Cleveland OH.
8. 2008 "Of Mice and Men: Regulation of the Epithelial Sodium Channel by Trafficking in Human Airway and Mouse Kidney" Department of Physiology & Biophysics, SUNY at Buffalo SMBS, Buffalo NY
9. 2006 "ENaC Regulation by Vesicle Recycling" The University of Texas Health Science Center at San Antonio, Department of Physiology, San Antonio, TX
10. 2005 "ENaC regulation by means of cytoskeletal-dependent trafficking and recycling." Cystic Fibrosis Foundation, Williamsburg Conference, Williamsburg, VA.
11. 2004 "Regulation of the Epithelial Sodium Channel by Recycling. Implications for Hypertension." Fellows Research Day, American Heart Association, Pittsburgh, PA.
12. 2003 "Acute ENaC regulation by vesicle recycling". Renal-Electrolyte Division, Dept. Medicine, University of Pittsburgh, Pittsburgh, PA.

B) Conferences

2016- Symposium Chair: "MICROBIOTA OR NUTRITION AND HOST CELL SIGNALING". Experimental Biology 2016, San Diego, CA
2011- Symposium Organizer & Chair: "Epithelial Ion Channel Trafficking". Experimental Biology 2011, Washington D.C.
2011- Symposium Chair: "Regulation of distal ion transport: ENaC and ROMK". Experimental Biology 2011, Washington D.C.

C) Committees

The American Physiological Society: International Committee (2015-2017)
University of Pittsburgh: Integrative Systems Biology Graduate Program, Curriculum Committee (2015)
University of Pittsburgh: Senate Council Member (2012-2014)
University of Pittsburgh: Faculty Assembly Member (2012-2014)
Salt and Water Club: Secretary (2012-2015)
Department of Cell Biology: Space Committee
Department of Cell Biology: Departmental Retreat Committee (2012-2014)
Department of Cell Biology: Seminar Series Coordinator (2012-2014)

D) Editorial Boards

2009 – present: American Journal of Physiology – Renal Physiology
2010 – present: Frontiers in Renal and Epithelial Physiology
2015 – present: Physiological Genomics
2011 – present: PLoS ONE

E) Grant Reviewer (Funding Agencies/Study Sections)

2015 VA Merit Award Study Section (Nephrology Council)
2014 AHA (National)
2012 CIHR (Canadian Institutes of Health Research)
2010, 2012 Medical Research Council (UK)
2010 American Heart Association (National committee)
2009 American Heart Association (AHA- Regional)
2008 Rappaport Institute (Israel Institute of Technology, Haifa, Israel)

F) Journal Reviewer (Ad Hoc):

American Journal of Physiology: Cell Physiology
American Journal of Physiology: Lung Cellular and Molecular Physiology
American Journal of Physiology: Renal
American Journal of Respiratory Cell and Molecular Biology
Cellular and Molecular Life Sciences
Cellular Physiology and Biochemistry
FASEB Journal
FEBS Letters
Fish Physiology and Biochemistry
Journal of Biological Chemistry
Journal of Cellular and Molecular Medicine
Kidney International
Molecular and Cellular Endocrinology
Physiological Genomics
PLoS ONE

G) External PhD Examiner

University of Otago, New Zealand (PhD)

PROFESSIONAL COURSES

Year ***Course Description***

2008 **Course in Scientific Management and Leadership**: Three day workshop held at the University of Pittsburgh designed to provide insight into leadership and team building as well as direction on how to develop and manage a scientific laboratory or research program.

2008 **FASEB Summer Research Conference**: Week-long conference on "Regulation and Function of Small GTP-ases" held in Saxtons River, Vermont

2008 **FASEB Seminar Series ("Write Winning Grants")**: Full day workshop on grant writing skills.

2003 **Quantitative Fluorescent Microscopy**: Week-long intensive microscopy course held at the Marine Biological Labs (MDIBL), Maine. Focused on latest light and fluorescent microscopy techniques and equipment

TEACHING/MENTORING EXPERIENCE

Director

Cell Biology and Molecular Physiology Graduate Program

Course Director

Integrated Systems Biology Graduate Program

2016 Quantitative Imaging (Core Course)

Graduate Student/s

2012-present Christine Klemens

Rotation Students

2015 Rachel Wills (CBMP)
2016 Ricardo DeMoya (ISB)

Undergraduate student researchers (summer research programs)

2013 Katherine Pilewski (Boston College)
2011 Ahn-Tu Le (Cornell University)
2009 Robin Arnold (University of Buffalo, SUNY)

University of Pittsburgh (Medical & Graduate Student Teaching)

Years	*Course Taught*	*Position*	*Student #*
2015	Cellular Biology of Normal and Disease States Graduate course MSCBMP2880 for Cell Biology	Instructor	5
2014-15	Cellular and Pathologic Basis of Disease (Medical Students)	Instructor	24
2014	Methods and Logic in Medicine (Medical Students)	Facilitator	8
2014	Foundation Conferences (IBPG Graduate students)	Preceptor	6
2013	Methods and Logic in Medicine (Medical Students)	Facilitator	8
2013	Cellular and Pathologic Basis of Disease (Medical Students)	Instructor	24
2012	Methods and Logic in Medicine (Class of 2015)	Facilitator	8
2012	Structure and Function of Polarized Epithelial Cells Intensive Laboratory Research Course for U. Pittsburgh 1st Year Medical Students (MDIBL, Maine)	Faculty	25
2012	Cellular and Pathologic Basis of Disease (Medical Students)	Instructor	24
2012	Cellular Biology of Normal and Disease States Graduate course MSCBMP2880 for Cell Biology and Molecular Physiology Graduate Program	Instructor	5
2012	Integrated Case Studies (Medical Student Class of 2014)	Facilitator	9
2011	Methods and Logic in Medicine (Class of 2014)	Facilitator	8
2011	Cellular Biology of Normal and Disease States Graduate course MSCBMP2880	Instructor	8
2006	Structure and Function of Polarized Epithelial Cells. (1st Yr. Medical Students)	Faculty	25