

CURRICULUM VITAE  
University of Pittsburgh  
School of Medicine

**BIOGRAPHICAL**

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**EDUCATION and TRAINING**

**UNDERGRADUATE:**

1997-2001	Yale University New Haven, CT	BS, 2001	Ecology & Evolutionary Biology <i>magna cum laude</i>
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**GRADUATE:**

2001-2007	Yale University New Haven, CT	MS, 2003; PhD, 2007	Ecology & Evolutionary Biology Advisors: Leo W. Buss & Stephen L. Dellaporta
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**POSTGRADUATE:**

2007-2009	Harvard University Cambridge, MA	Postdoctoral Fellow	Immunology Advisor: Jack L. Strominger
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**APPOINTMENTS and POSITIONS**

2009-2013	Thomas E. Starzl Transplantation Institute Department of Surgery University of Pittsburgh Pittsburgh, PA	Research Instructor
2013-present	Thomas E. Starzl Transplantation Institute Department of Surgery University of Pittsburgh Pittsburgh, PA	Assistant Professor
2014-present	Department of Immunology University of Pittsburgh Pittsburgh, PA	Secondary Appointment

2017-present      Center for Evolutionary Biology and Medicine      Associate Director and  
University of Pittsburgh      Founding Member  
Pittsburgh, PA

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### MEMBERSHIP in PROFESSIONAL and SCIENTIFIC SOCIETIES

Society for Integrative and Comparative Biology	2013-present
American Association of Immunologists	2014-present
Hydrozoan Society	2016-present
International Society for Developmental and Comparative Immunology	2017-present
International Society for Evolution, Medicine, and Public Health	2020-present
Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)	2020-present

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### HONORS

Honorable Mention, NSF Graduate Research Fellowship Program	2001
Distinction in the major of Ecology and Evolutionary Biology	2001
GAANN Fellow (Graduate Assistance in Areas of National Need)	2001-2003
John Spangler Nicholas Prize for Outstanding Doctoral Thesis	2008
University of Pittsburgh Internal Nominee for the Searle Scholars Program	2013
University of Pittsburgh Internal Nominee for the Keck Foundation Medical Research Grant	2014

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### PUBLICATIONS

#### Peer Reviewed Refereed Articles

1. Cadavid LF\*, Powell AE\*, **Nicotra ML\***, Moreno M, and Buss LW\*. “An invertebrate histocompatibility complex.” *Genetics*. 2006;167(1):357-365. Pubmed PMID: 15166160  
*\*these authors contributed equally to this work*
2. **Nicotra ML** and Buss LW. “A test for larval kin aggregations.” *The Biological Bulletin*. 2005;208(3):157-158. Pubmed PMID: 15965120
3. Powell AE, **Nicotra ML**, Moreno MA, Lakkis FG, Dellaporta SL, Buss LW. “Differential effect of allorecognition loci on phenotype of *Hydractinia symbiolongicarpus* (Cnidaria: Hydrozoa).” *Genetics*. 2007;177(4):2101–2107. Pubmed PMID: 17947438
4. Li C, Ge B, **Nicotra ML**, Stern J, Kopcow H, Chen X, Strominger JL. “JNK MAP kinase activation is required for MTOC and granule polarization in NKG2D-mediated NK cell cytotoxicity.” *Proceedings of the National Academy of Sciences of the United States of America*. 2008;105(8):3017-3022. Pubmed PMID: 18287025.
5. Li C, Houser BL, **Nicotra ML**, Strominger JL. “HLA-G homodimer-induced cytokine secretion through HLA-G receptors on human decidual macrophages and natural killer cells.” *Proceedings of*

*the National Academy of Sciences of the United States of America*. 2009;106(14):5767-5772. Pubmed PMID: 19304799

6. **Nicotra ML**, Powell AE, Rosengarten RD, Moreno MA, Grimwood J, Lakkis FG, Dellaporta SL, Buss LW. “A hypervariable invertebrate allodeterminant.” *Current Biology*. 2009;19(7):583-589. Pubmed PMID: 19303297
7. Rosa SFP, Powell AE, Rosengarten RD, **Nicotra ML**, Moreno MA, Grimwood J, Lakkis FG, Dellaporta SL, Buss LW. “Hydractinia allodeterminant *alr1* resides in an Immunoglobulin Superfamily-like gene complex.” *Current Biology*. 2010;20(12):1122-1127. Pubmed PMID: 20537535.
8. Houser BL, Tilburgs T, Hill J, **Nicotra ML**, Strominger JL. “Two unique human decidual macrophage populations.” *Journal of Immunology*. 2011;186(4):2633-2642. Pubmed PMID: 21257965.
9. Karadge UB, Gosto M, **Nicotra ML**. “Allorecognition proteins in an invertebrate exhibit homophilic interactions.” *Current Biology*. 2015;25(21): 2845-2850. Pubmed PMID: 26455308.
10. Dai H, Friday AJ, Abou-Daya KI, Williams AL, Mortin-Toth S, **Nicotra ML**, Rothstein DR, Shlomchik WD, Matozaki T, Isenberg JS, Oberbarnscheidt MH, Danska JS, and Lakkis FG. “Donor SIRPα polymorphism modulates the innate immune response to allogeneic grafts.” *Science Immunology* 2017;2(12) eaam6202. Pubmed PMID: 28783664.
11. Sanders SM, Ma Z, Hughes JM, Riscoe BM, Gibson GA, Watson AM, Flici H, Frank U, Schnitzler CE, Baxevanis AD, **Nicotra ML**. “CRISPR/Cas9-mediated gene knockin in the hydroid *Hydractinia symbiolongicarpus*.” *BMC Genomics*. 2018;19:649. Pubmed PMID: 30176818.
12. Dai H, Lan P, Zhao D, Abou-Daya K, Liu W, Chen W, Friday AJ, Williams AL, Sun T, Chen J, Chen W, Mortin-Toth S, Danska JS, Wiebe C, Nickerson P, Li T, Mathews LR, Turnquist HR, **Nicotra ML**, Gingras S, Takayama E, Kubagawa H, Shlomchik MJ, Oberbarnscheidt MH, Li XC, Lakkis FG. “PIRs mediate innate myeloid cell memory to nonself MHC molecules.” *Science*. 2020;368(6495):1122-1127. Pubmed PMID: 32381589.
13. Wozniak KL, Bainbridge RE, Summerville DW, Tembo M, Phelps WA, Sauer ML, Wisner BW, Czekalski ME, Pasumarthy S, Hanson ML, Linderman MB, Luu CH, Boehm ME, Sanders SM, Buckley KM, Bain DJ, **Nicotra ML**, Lee MT, Carlson AE. “Zinc protection of fertilized eggs is an ancient feature of sexual reproduction in animals.” *PLoS Biol* 2020;18(7): e3000811. Pubmed PMID: 32735558.
14. Huene AL, Chen T, **Nicotra ML**. “New binding specificities evolve via point mutation in an invertebrate allorecognition gene.” *iScience* 2021; 24(7):102811. Pubmed PMID: 34296075.
15. Huene AL and **Nicotra ML**. “Cell aggregation assays for homophilic interactions between cell surface proteins.” *Methods in Molecular Biology* 2022; 2421:91-102. Pubmed PMID: 34870813

#### Other Peer Reviewed Publications

1. Rosengarten RD and **Nicotra ML**. “Model systems of invertebrate allorecognition.” *Current Biology*. 2010;21(2):R82-92. Pubmed PMID: 21256442.

- Frank U, **Nicotra ML**, Schnitzler CE. "The colonial cnidarian *Hydractinia*." *Evodevo*. 2020;11:7. Pubmed PMID: 32226598.
- Nicotra ML. "The *Hydractinia* allorecognition system." *Immunogenetics*.

### Other Non-Peer Reviewed Publications

- Nicotra ML**. "A gut response." *eLIFE* 2017;6:e28152. Pubmed PMID: 28574337.
- Nicotra ML**. "Invertebrate Allorecognition." *Current Biology* 2019;29(11):Pr463-R467. Pubmed PMID: 31163159
- He S, Grasis JA, **Nicotra ML**, Juliano CE, Schnitzler CE. "Cnidofest 2018: The future is bright for cnidarian research." *Evo Devo*. 2019;10:20. Pubmed PMID: 31508195.

### Preprints (submitted to peer-reviewed journals)

- Huene AL, Sanders SM, Ma Z, Nguyen A, Koren S, Michaca MH, Mullikin JC, Phillippy AM, Schnitzler CE, Baxevanis AD, **Nicotra ML**. "The *Hydractinia* Allorecognition Complex encodes a novel family of immunoglobulin superfamily proteins." *bioRxiv*. 2022.03.04.482883; doi: 10.1101/2022.03.04.482883
- Travert M, Boohar R, Sanders SM, **Nicotra ML**, Leclère L, Steele RE, Cartwright P. "Coevolution of the *Tlx* homeobox gene with medusa development (Cnidaria: Medusozoa)." *bioRxiv*. 2022.03.08.483504; doi: 10.1101/2022.03.08.483504
- Chen R, Sanders SM, Ma Z, Paschall J, Sally Chang E, Riscoe BM, Schnitzler CE, Baxevanis AD, **Nicotra ML**. XY sex determination in a cnidarian. *bioRxiv*. 2022.03.22.485406; doi: 10.1101/2022.03.22.485406

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## PROFESSIONAL ACTIVITIES

### TEACHING:

2002	Writing Intensive Teaching Fellow, Principles of Evolution, Ecology, and Behavior (Yale University)
2003	Guest Lecturer, Marine Biology (St. George's University, Grenada, West Indies)
2003	Teaching Assistant, Evolutionary Biology (Yale University)
2010-2011	Lecturer, Comprehensive Immunology (1 lecture)
2012	Lecturer, Immunology (1 lecture)
2012, 2017-2019	Instructor, Immunology in Health and Disease PBL (6 sessions per year)
2015	Lecturer, Evolutionary Genetics & Development of Phenotypes (1 lecture)
2015-2021	Lecturer, Model Organisms (1 lecture)
2016-2018	Instructor, Molecular Biology PBL
2016-2021	Instructor, Foundations Conference (5-6 sessions per year)

2018-2019 Director, Integrative Systems Biology Conference, oversee student led conferences  
 2019 Lecturer, Innate Immunity (1 lecture)  
 2020 Lecturer, Evolutionary Biology of Human Disease (4 Lectures)

## **Mentoring**

### Postdocs

2013-2015 Uma Karadge, PhD  
 2015-present Steven Sanders, PhD

### Graduate Students

2016-present Aidan Huene (University of Pittsburgh, Integrative Systems Biology Program)  
 2020-present Manuel Michaca (University of Pittsburgh, IBGP, CMBP)

### Undergraduates

2003-2004 Benjamin Krinsky (Yale University) *Fine scale mapping of the Hydractinia Allorecognition Complex via a novel STS marker*  
 2008-2009 Vernon Wu (Harvard University) *Development of Galectin 1 ELISAs*  
 2011-2013 Shruti Iyer (University of Pittsburgh) *Creation of EGFP expression vectors for transgenic Hydractinia*  
 2014 Benjamin Clancy (University of Pittsburgh) *Cloning and ectopic expression of Hydractinia allorecognition molecules*  
 2013-2016 Joseph Holjencin (University of Pittsburgh) *Cloning and ectopic expression of Hydractinia allorecognition molecules*  
 2016-2017 Julia Hughes (University of Pittsburgh)  
 2016-2021 Brooke Riscoe (University of Pittsburgh) *Identification of novel allodeterminants via genetic mapping*  
 2017-2018 Morgan Simms (University of Pittsburgh)  
 2018-2019 Jordana Goulet (University of Pittsburgh)  
 2020-2021 Traci Chen (University of Pittsburgh)  
 2020-present Srijia Konduru (University of Pittsburgh)  
 2022-present Vaani Bansal (University of Pittsburgh)

### High School Students

2012-2013 Kevin Williams (Pittsburgh Public Schools SciTech) *Creation of FLAG-tagged cadherin constructs for cell aggregation assays*  
 2013-2014 Kayla Payne (Pittsburgh Public Schools SciTech) *Creation of RFP expression constructs for Hydractinia.*  
 2016-2017 Annika Williams (Pittsburgh Public Schools SciTech) *Effect of the NFkB inhibitor TPCA-1 on Hydractinia allorecognition*  
 2018 Haley Dion (St. Mark's School, Southborough, MA) *Ability of cell permeable peptides to enter Hydractinia cells*  
 2018-2019 Nicole Shigiltchoff (Winchester Thurston) *Identification of novel allodeterminants via genetic mapping*  
 2018-2019 Samuel Leiberman (Pittsburgh Public Schools SciTech) *Cell migration during transitory fusion responses*

## Thesis Committees

2018-2022	Julia Loose (Interdisciplinary Biomedical Graduate Program, Molecular Genetics and Developmental Biology)
2019-2021	Jessica Toothaker (Program in Microbiology and Immunology)
2020-present	Roger Tieu (Medical Scientist Training Program, Program in Microbiology and Immunology)
2022-present	<i>Chair</i> , Lin Chou (Integrative Systems Biology)
2022-present	<i>Chair</i> , Mische Holland (Biological Sciences)

## RESEARCH:

### 1. Current Grant Support

Grant Number	Title	Role ( <i>effort</i> )	Years Inclusive	Source	\$ Amount
2R01AI099465	Innate Recognition of Allogeneic Non-self (PI: Lakkis)	Co-Investigator 5%	2018-2023	NIH	\$32,905 (direct only)
IOS-1923259	EDGE CT: Enabling cell-specific genomics in a colonial animal	Co-PI	2019-2022	NSF	\$629,545 (total)

\*Salary support for PIs cannot exceed a total of 2 calendar months across all active NSF grants.

### 2. Prior Grant Support

Grant Number	Title	Role ( <i>effort</i> )	Years Inclusive	Source	\$ Total Direct Funds
IOS-1255975	Biochemical and Biophysical Mechanisms of Hydroid Allorecognition	PI <i>2 cal months*</i>	2013-2017	NSF	\$445,000 (total)
1R01AI099465	Innate Recognition of Allogeneic Non-self (PI: Lakkis)	Collaborator <i>1 cal month</i>	2012-2017	NIH	\$52,841 (direct only)
	Stuart K. Patrick Grant for Transplant Innovation (PI: Camirand)	Co-Investigator 5%	2018-2019	STI	\$6,581 (direct only)
IOS-1557339	Structural Basis of Self-recognition in Hydroid Allorecognition Proteins	PI <i>2 cal months*</i>	2016-2020	NSF	\$726,738 (total)

\*Salary support for PIs cannot exceed a total of 2 calendar months across all active NSF grants.

### 3. Other research related activities

#### Journal Refereeing

Biological Bulletin, Current Biology, Developmental and Comparative Immunology, eLIFE, Evolution and Development, Frontiers in Innate Immunity, Journal of Immunology, Journal of Visualized Experiments, Journal of Sea Research, Molecular Biology and Evolution, PLoS ONE,

PNAS, Proceedings of the Royal Society B, Reproduction, Fertility, and Development, Scientific Reports, Science Signaling, Trends in Genetics

Study Sections

National Science Foundation Panel Member Apr 2013, Oct 2013, Nov 2019

Extramural grant reviewing

United States-Israel Binational Science Foundation 2007  
National Science Foundation, Ad Hoc Reviewer 2021

**LIST of CURRENT RESEARCH INTERESTS:**

Allorecognition, Cell Adhesion, Genomics, Molecular Genetics, Invertebrate Zoology, Molecular Evolution, Comparative Immunology, Innate Immunity, Transplantation, Stem Cell Biology, Cellular Dedifferentiation.

**INVITED SEMINARS and LECTURESHIPS**

**Invited Seminars**

2022 *Plenary* - Local DC Comparative Immunology Meeting, George Washington University  
2021 Department of Pediatrics, University of Pittsburgh  
2020 Department of Biology, Auburn University  
2020 Department of Biology, Duquesne University  
2019 Institute of Marine and Environmental Technology, University of Maryland  
2019 International Titisee Conference: Evolution of immune defense mechanisms, Titisee, Germany  
2019 Department of Biology, Lehigh University  
2018 Center for Evolutionary and Theoretical Immunology, University of New Mexico  
2016 Whitney Marine Lab, University of Florida  
2016 College of Marine Science, University of South Florida  
2016 Department of Biology, Carnegie Mellon University  
2015 5<sup>th</sup> Annual Acute Kidney Injury Symposium, University of Pittsburgh  
2014 Department of Developmental Biology, University of Pittsburgh School of Medicine.  
2014 Department of Biological Sciences, University of Pittsburgh.  
2014 Senior Vice Chancellor's Research Seminar, University of Pittsburgh School of Medicine.  
2013 National Human Genome Research Institute, NIH, Bethesda, MD.  
2011 Science 2011. University of Pittsburgh. Pittsburgh, PA.  
2010 Department of Immunology, University of Pittsburgh School of Medicine.  
2008 3<sup>rd</sup> International DAMPs and Alarmins Symposium. Pittsburgh, PA.  
2006 FASEB Summer Research Conference in Transplant Immunology. Snowmass, CO.  
2006 Starzl Transplantation Institute, University of Pittsburgh, Pittsburgh, PA.  
2006 Genetics Grand Rounds, Tufts-New England Medical Center, Boston, MA.

## SERVICE

### 1. University and Medical School

#### Centers

2017 Co-founder, Center for Evolutionary Biology and Medicine  
2017-present Associate Director, Center for Evolutionary Biology and Medicine

#### Seminar Series

2019-present Co-organizer, Molecular Evolution Lab Discussion (*Monthly seminar series that brings together labs doing research in molecular evolution across the University of Pittsburgh and Carnegie Mellon University*)  
2021-present Center for Evolutionary Biology and Medicine Seminar Series

#### Committees

2016-2019 Externship Planning Committee, Integrative Systems Biology Program  
2016-2018 Admissions Committee, Integrative Systems Biology Program  
2015-2016 Chair, Department of Immunology Retreat Planning Committee  
2014-2015 Department of Immunology Retreat Planning Committee

### 2. International Service

#### Committees

2020-2021 Co-organizer, [Cnidofest Zoom Seminar Series](#)  
2019-2022 Co-organizer, Cnidarian Model Systems Meeting, Davis, CA  
2018 Organizing Committee, Cnidarian Model Systems Meeting, St. Augustine, FL

#### Resources

2022 Continuing development of [hydractinia.org](http://hydractinia.org), a resource hub for the *Hydractinia* research community.