

# AMY LYNN TOTH

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## 1. RESEARCH AREAS

Social Behavior, Evolutionary Genomics, Nutritional Physiology, Pollinator Health

## 2. EDUCATION

Ph.D, Ecology and Evolutionary Biology, University of Illinois, Urbana-Champaign, advisor: Gene E. Robinson, December 2006

B.A., Biology, Bard College, Annandale-on-Hudson, NY, advisor: William T. Maple, May 2000

## 3. PROFESSIONAL APPOINTMENTS

Associate Professor, Departments of Ecology, Evolution, and Organismal Biology and Entomology, Iowa State University, August 2016-present

Assistant Professor, Departments of Ecology, Evolution, and Organismal Biology and Entomology, Iowa State University, August 2011-July 2016

Adjunct Assistant Professor, Department of Ecology, Evolution, and Organismal Biology, Iowa State University, August 2010-August 2011

USDA Postdoctoral Fellow, Department of Entomology, Pennsylvania State University, *Uncovering conserved molecular pathways for social insect reproduction and social behavior*, advisor Christina M. Grozinger, August 2008-August 2010

Postdoctoral Research Associate, Department of Entomology and Institute for Genomic Biology, University of Illinois, *Genomic analyses of insect social behavior*, advisor Gene E. Robinson, January 2007-July 2008

## 4. TEACHING AND MENTORING

### 4.1 COURSE INSTRUCTION

**Instructor and Course Developer** of 7 courses at Iowa State University

Co-Instructor, ENT 358X/BIOLOG 358X Bee Biology, Management, and Beekeeping, Fall 2015 (with Adam Dolezal) \* co-developed as a new course

Instructor, EEOB 507 Advanced Animal Behavior: Genes and Behavior, Spring 2014, 2015, 2016 \* existing course number, developed as a new course

Instructor, BIOLOG 354 Animal Behavior, Fall 2013, 2014, 2015, 2016 \* existing course, but lecture portion developed from scratch

Co-Instructor, BIOLOG 354L, Animal Behavior Laboratory, Fall 2013, Fall 2014, Fall 2015 (with Teaching Assistant) \* existing course

Co-Instructor, BCB660: Applications of Next Generation Sequencing Data Processing Software in Genomics, Fall 2011 (with Volker Brendel) and Fall 2012 (with Andrew Severin) \* co-developed as a new course

Instructor, BIOLOG 495: Science, Evolution, and Creationism, Iowa State University, Spring 2012 \* developed as a new course

Instructor, EEB698: Genomic Applications to Ecology and Evolutionary Biology, Iowa State University, Fall 2011 \* developed as a new course

**Guest Lecturer** in 9 courses (typically 2 guest lectures per year)

Core Concepts in Ecology and Evolutionary Biology, Advanced Animal Behavior, Invertebrate Biology, Pollination Biology, and an undergraduate evolution seminar, Iowa State University, 2011-present

Evolution in Insect Societies, Penn State University, 2010

Introduction to Entomology, Animal Behavior, Insects & People, and Genes & Behavior classes, University of Illinois, 2002, 2003, 2004, 2007, 2008

**Teaching Assistant** of 3 courses

Teaching Assistant, Integrative Biology 429 Animal Behavior, University of Illinois, 2005

Teaching Assistant, Biology 120 Genetics, Evolution, and Biodiversity, University of Illinois, 2001-2002

Laboratory Teaching Assistant, Biology 102 Ecology and Organismal Biology, Bard College, 1999

**Workshop Instructor** for beekeeping class

Instructor, Bees and Beekeeping Two-Day Short Course, University of Illinois, yearly 2000-2003

#### 4.2 GRADUATE PROGRAM MEMBERSHIPS

Ecology and Evolutionary Biology (EEB), Iowa State University

Bioinformatics and Computational Biology (BCB), Iowa State University

Interdepartmental Genetics and Genomics (IGG), Iowa State University

Entomology Graduate Program (ENT), Iowa State University

#### 4.3 GRADUATE AND POSTGRADUATE MENTORING

**Postdoctoral Mentor** to 4 postdoc research associates at Iowa State University

<b>Name (role)</b>	<b>Years</b>	<b>Current Position</b>
<b>Dr. Susan Weiner</b>	2010-2013	Assistant Professor, Roosevelt University (Chicago, IL)
<b>Dr. Jimena Carrillo-Tripp</b> (co-advisor, with W.A. Miller)	2012-2015	Research Scientist, Pioneer (Johnston, IA)
<b>Dr. Jennifer Jandt</b>	2012-2015	Assistant Professor, University of Otago (New Zealand)
<b>Dr. Adam Dolezal</b>	2012-present	Postdoctoral Research Associate, Iowa State University

**Thesis Advisor** to 9 graduate students at Iowa State University

<b>Name (role)</b>	<b>Degree, Years (* if completed)</b>	<b>Graduate Program at ISU</b>
<b>Ali Berens</b> (Major, with Peng Liu)	PhD, 2010-2015*	Bioinformatics and Computational Biology
<b>Melissa Telemeco</b> (Co-advisor, with C. Kelly)	MS, 2013-2014*	Ecology and Evolutionary Biology
<b>Daniel Standage</b> (Co-advisor, with V. Brendel)	PhD, 2010-present	Bioinformatics and Computational Biology
<b>Alex Walton</b> (Major advisor)	PhD, 2012-present	Ecology and Evolutionary Biology
<b>Lindsay Rutter</b> (Co-advisor, with D. Cook)	PhD, 2013-present	Bioinformatics and Computational Biology
<b>Amy Geffre</b> (Major advisor)	PhD, 2014-present	Ecology and Evolutionary Biology
<b>Ashley St. Clair</b> (Major advisor, with M. O'Neal)	PhD, 2015-present	Ecology and Evolutionary Biology
<b>Ge Zhang</b> (Co-advisor, with M. O'Neal)	PhD, 2015-present	Entomology
<b>Cameron Fay</b> (Major, co-advisor TBD)	PhD, 2015-present	Bioinformatics and Computational Biology
<b>Shunji Li</b> (Co-advisor, with B. Bonning)	MS, 2015-present	Entomology

**Rotation Mentor** for 6 graduate students at ISU

Cameron Fay, Lindsay Rutter, Ruolin Liu, Ali Berens, Srihari Radhakrishnan (Bioinformatics and Computational Biology), 2010-2013

Kevin Quinteros (Interdepartmental Genetics and Genomics), 2015

**Faculty Mentor for Preparing Future Faculty Program** for 5 students and postdocs, ISU

Manju Elmore, Brooke Bodensteiner, Karin Grimlund, Jessie Colpoys, Justin Van Goor, 2014-present

**Member of Graduate Thesis Committee** (Program of Study) for 17 students, ISU

<b>Graduate Program</b>	<b>Degree</b>	<b>Names of Students (* if completed)</b>
<b>Bioinformatics and Computational Biology</b>	PhD	Hsien-chao Chou*, Srihari Radhakrishnan*, Ruolin Liu
<b>Ecology and Evolutionary Biology</b>	PhD	John Delaney*, Antonio Cordero*, Rebecca Polich, Justin Van Goor, Karri Folks, Tori Pocius
<b>Ecology and Evolutionary Biology</b>	MS	David Stein

<b>Entomology</b>	MS	Michael Rausch*
<b>Interdepartmental Genetics and Genomics</b>	PhD	Joseph Gallagher, Daniela Flores, Garrett Janzen, Ryan Arndorfer, Andrew Harley
<b>Molecular, Cellular, and Developmental Biology</b>	MS	Katrina Lutap*

#### 4.4 UNDERGRADUATE MENTORING

**Academic Advisor** for 14 undergraduate students at ISU (10 Biology majors, 4 Genetics majors), 2011-present

**Research Mentor** for 16 undergraduate research projects as part of 9 different programs

<b>Name</b>	<b>Years</b>	<b>Program (University)</b>
<b>Erin McCall</b>	2015-2016	Independent Research Credits (ISU)
<b>Caitlin Pace</b>	2016	Independent Research Credits (ISU)
<b>Marit Bakken</b>	2016	Honors Thesis (ISU)
<b>Colby Behrens</b>	2016	Science with Practice Program (ISU), Honors Thesis (ISU)
<b>Kate Hunter</b>	2014-2015	Honors Thesis (ISU)
<b>Amber Haritos</b>	2014-2015	McNair Scholar Program (ISU)
<b>Giselle Narvaez</b>	2014-2015	McNair Scholar Program (ISU)
<b>Carlos Vega</b>	Summer 2012	G.W. Carver Program (ISU)
<b>Chad Soenksen</b>	Summer 2013	Research Experiences for Undergrad. (ISU)
<b>Mara Cuebas</b>	Summer 2013	G.W. Carver Program (ISU)
<b>Jessica Thomson</b>	Summer 2013	G.W. Carver Program (ISU)
<b>Nicole Scavo</b>	Summer 2013	Iowa Lakeside Lab Fellowship (ISU)
<b>Corey Lange</b>	2011-2012	Science with Practice Program (ISU)
<b>David Galbraith</b> (with C. Grozinger)	2009-2010	Honors Thesis (Penn State Univ.)
<b>Timothy Daugherty</b> (with G. Robinson)	2008-2009	Honors Thesis awarded High Distinction (Univ. of Illinois)
<b>Adam Meisel</b> (with G. Robinson)	2003	Hughes Undergrad. Research Fellowship (Univ. of Illinois)

**Supervisor** of 50 student researchers and research assistants (36 at ISU) 46 undergraduates, and 2 graduate level assistants, University of Illinois, Pennsylvania State University, and Iowa State University, 2001-present

**Graduate Administrator** of NSF Undergraduate Mentoring in Environmental Biology Program, University of Illinois, 2002

## 4.5 HIGH SCHOOL STUDENT AND TEACHER MENTORING

Research Mentor for 6 high school research projects as part of 3 different programs

Name	Years	Program (University)
Kennady Lilly	Summer 2014	Young Engineers & Scientists Prog. (ISU)
Vera Zhao	2010-2012	Ames High School-ISU Partnership
Jon Temple	Summers 2011-2012	Research Experiences for Teachers Program (ISU)
Ron Schuck	Summer 2012	Research Experiences for Teachers Program (ISU)
Chris Dyer	Summer 2013	Research Experiences for Teachers Program (ISU)
Alex Conyers	Summer 2015	Research Experiences for Teachers Program (ISU)

## 5. PUBLICATIONS

Author of 43 publications including 41 in peer-reviewed journals, 2 book chapters/reviews

Toth in bold, \* denotes member of Toth laboratory, + denotes undergraduate author

Impact Factors refer to 5-year impact factors (indicated with~) or most recent (usually 2014) impact factors for each journal

### 5.1 PAPERS IN PEER-REVIEWED JOURNALS (total 45)

*Published after coming to ISU (31 total)*

45. **Toth, A.L.**, Rehan, S.M. Molecular evolution of insect sociality: an eco-evo-devo perspective. In press, *Annual Review of Entomology*.

Impact Factor	Toth contribution	Description
13.534	Concept (70%) and writing (70%)	Major review of mechanisms and evolutionary factors related to insect sociality

44. Dolezal, A.G.\*, Scavo, N.A.+ , Hendrix, S., Harris, M., O'Neal, M., **Toth, A.L.** Honey Bee Viruses in Wild Bees: Viral Prevalence, Loads, and Experimental Inoculation In press, *PLoS One*. 11 (11): e0166190

Impact Factor	Toth contribution	Description
3.234	Concept (30%) and writing (20%)	Shows honey bee viruses commonly found in other bee species, with no evidence of mortal infection

43. **Toth, A.L.**, Sumner, S., Jeanne, R.L. 2016. Patterns of longevity across a sociality gradient in vespid wasps. *Current Opinion in Insect Science*. 16: 28-35

Impact Factor	Toth contribution	Description
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2.719	Concept (70%) and writing (70%)	First review of analysis of longevity patterns in social wasps
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42. Dolezal, A.G.\*, Carrillo-Tripp, J.\*, Miller, W.A., Bonning B.C. **Toth, A.L.** 2016. Intensively cultivated landscape and Varroa mite infestation are associated with reduced honey bee nutritional state. *PLoS One*. 11 (4): e0153531.

Impact Factor	Toth contribution	Description
3.234	Concept (60%) and writing (30%)	Utilizing volunteer beekeepers, shows intense landscape cultivation associated with poor bee nutrition

41. Smith, G.W.+, Debinski, D.M, Scavo, N.A.+, Lange, C.J.+, Delaney, J.T., Moranz, R.A., Miller, J.R., Engle, D.M. and **Toth, A.L.** 2016. Bee abundance and nutritional status in relation to grassland management practices in an agricultural landscape. *Environmental Entomology*. 45 (2): 338-347.

Impact Factor	Toth contribution	Description
1.689~	Data (25%), concept (75%) and writing (75%)	Integrates grassland management ecology and physiology to investigate patterns of nutritional health in bumble bees and honey bees

40. Carrillo-Tripp, J.\*, Dolezal, A.G.\*, Goblirsch, M.J., Miller, W.A., **Toth, A.L.**, and Bonning B.C. 2016. *In vivo* and *in vitro* infection dynamics of honey bee viruses. In press, *Scientific Reports* 6.

Impact Factor	Toth contribution	Description
5.578	Concept (30%) and writing (20%)	First study to use honey bee cell line to study interactions between different species off bee virus

39. Walton, A.\* and **Toth, A.L.** 2016. Individual variation in honey bee behavior shows hallmarks of personality. *Behavioral Ecology and Sociobiology*. 70 (7): 999.

Impact Factor	Toth contribution	Description
2.565	Concept (50%) and writing (40%)	Behavioral study that is first comprehensive investigation of whether honey bees have personalities

38. Standage, D.S., Berens, A.J., Glastad, K., Severin, A.J., Brendel, V., and **Toth, A.L.** 2016. Genome, transcriptome, and methylome sequencing of a primitively social wasp reveal a dramatic reduction in DNA methylation in a social insect. *Molecular Ecology*. 25 (8): 1769-1784.

Impact Factor	Toth contribution	Description
6.494	Data (100%), concept (90%) and writing (50%)	Large scale –omics study, first known major loss of DNA methylation in a social insect

37. Berens, A.J., Tibbetts, E.A., and Toth, A.L. 2016. Candidate genes for individual recognition in *Polistes fuscatus* paper wasps. *Journal of Comparative Physiology A*. 202: 115-129.

Impact Factor	Toth contribution	Description
2.036	Concept (40%) and writing (40%)	Identifies genes related to calcium signaling associated with individual social memory in wasps

36. Durant, D.R., Berens, A.J.\*, **Toth, A.L.**, and Rehan, S.A. 2015. Transcriptional profiling of overwintering gene expression in the small carpenter bee *Ceratina calcarata*. *Apidologie*. 47 (4): 572–582.

Impact Factor	Toth contribution	Description
1.676	Concept (20%) and writing (25%)	Uses RNA-sequencing to identify genes associated with overwintering in a solitary native bee

35. Dolezal, A.G.\*, Carrillo-Tripp, J.\*, Miller, W.A., Bonning, B.C., and **Toth, A.L.** 2015. Pollen contaminated with field-relevant levels of cyhalothrin affects honey bee survival, nutritional physiology, and pollen consumption behavior. *Journal of Economic Entomology*. 109 (1): 41-48.

Impact Factor	Toth contribution	Description
1.830~	Concept (40%) and writing (40%)	Demonstrates that even low doses of a pesticide in pollen can have detrimental effects on bee health

34. Sheehan, M.J., Botero, C.A., Hendry, T.A., Sedio, B.E., Jandt, J.M.\*, Weiner, S.A.\*, **Toth, A.L.**, and Tibbetts, E.A. 2015. Different axes of environmental variation explain the presence versus extent of cooperative nest founding associations in *Polistes* paper wasps. *Ecology Letters*. 18 (10): 1057-1067.

Impact Factor	Toth contribution	Description
10.689~	Data (10%) and writing (10%)	Contributes to understanding the environmental factors that drive cooperative behavior

33. Rehan, S.M. and **Toth, A.L.** 2015. Climbing the social ladder: the molecular evolution of sociality. *Trends in Ecology and Evolution*. 30 (7): 426–433.

Impact Factor	Toth contribution	Description
19.819~	Concept (50%) and writing (50%)	A review of current hypotheses for the evolution of sociality and proposes a new synthetic framework

32. Jandt, J.M.\*, Thomson, J.L.+, Geffre, A.C.\* and **Toth, A.L.** 2015. Lab rearing perturbs social traits: a case study with *Polistes* wasps. *Behavioral Ecology*. 26 (5): 1274-1284.

Impact Factor	Toth contribution	Description
3.350~	Data (10%), concept (50%) and writing (50%)	A cautionary study showing major effects of lab rearing on behavior, physiology, gene expression

31. Jandt, J.M.\* and **Toth, A.L.** 2015. Physiological and genomic mechanisms of social organization in wasps (Hymenoptera: Vespidae). *Advances in Insect Physiology* 48: 95-130.



Impact Factor	Toth contribution	Description
4.89~	Concept (100%) and writing (50%)	A major review of studies on the physiology and genomics of social wasps

30. Berens, A.J.\*, Junt, J.H., and **Toth, A.L.** 2015. Nourishment level affects caste-related gene expression in *Polistes* wasps. *BMC Genomics*. 16: 235.

Impact Factor	Toth contribution	Description
3.99	Data (50%), concept (75%) and writing (50%)	Uses cutting edge RNA-sequencing techniques to show environmental effects on gene expression

29. Berens, A.J.\*, Hunt, J.H., and **Toth, A.L.** 2015. Comparative transcriptomics of convergent evolution: Different genes but conserved pathways underlie caste phenotypes across lineages of eusocial insects. *Molecular Biology and Evolution*. 32: 690-703.

Impact Factor	Toth contribution	Description
11.667~	Data (50%), concept (90%) and writing (50%)	Uses cutting-edge RNA sequencing to address genetic basis of convergent evolution, an important question in evolutionary biology

28. Rehan, S.M., Berens, A.J.\*, **Toth, A.L.** 2014. At the brink of eusociality: transcriptomic correlates of worker behaviour in a subsocial bee. *BMC Evolutionary Biology*. 14: 260.

Impact Factor	Toth contribution	Description
3.37	Concept (40%) and writing (25%)	Uses cutting-edge RNA sequencing to address a major hypothesis about the evolution of sociality

27. Skaggs, R., Jackson, J.C.+, **Toth, A.L.**, S. S. Schneider 2014. The vibration signal and ritualized aggression in the honey bee, *Apis mellifera*. *Animal Behaviour*. 98: 102-111.

Impact Factor	Toth contribution	Description
3.423~	Data (50%), concept (30%) and writing (20%)	An integrative study that addresses the evolution of communication signals

26. Beani, L., Dessi-Fulgheri, F., Cappa, F. and **Toth, A.L.** 2014. The trap of sex in social insects: from the female to the male perspective. *Neuroscience & Biobehavioral Reviews*. 46: 519-533.

Impact Factor	Toth contribution	Description
10.528~	Concept (10%) and writing (20%)	Major review of the understudied behavior of male social insects

25. Chowdhury, N.L., Cook, D., Hofmann, H., Majumder, M., and **Toth, A.L.** 2014. Visual statistical inference for high dimension, small sample size data. *Computational Statistics*. 2014: 1-24.

Impact Factor	Toth contribution	Description
0.403	Data (20%) and writing (5%)	Uses gene expression data from my work to investigate visual data analysis methods

24. Carrillo-Tripp, J.\*, Krueger, E.N., Harrison, R.L., **Toth, A.L.**, Miller, W.A. and Bonning, B.C. 2014. Lymantria dispar iflavivirus 1 (LdIV1), a new model to study iflaviral persistence in lepidopterans. *Journal of General Virology*. 95: 2285-96.

Impact Factor	Toth contribution	Description
3.18~	Resources (25%) and writing (5%)	Discovery of a new virus in an insect cell line that can be used to study persistent virus infections.

23. Miller, W.A., Carrillo-Tripp, J.\*, Bonning, B.C., Dolezal, A.G.\*, and **Toth, A.L.** 2014. Letter to the Editor: Conclusive Evidence of Replication of a Plant Virus in Honeybees Is Lacking. *mBio*. 5:3 1 e00985-14.

Impact Factor	Toth contribution	Description
6.781~	Concept (10%) and writing (30%)	A letter to the editor that challenges a study that suggested a plant virus can infect honey bees

22. **Toth, A.L.**, Tooker, J.T., Radhakrishnan, S.R.\*, Menard, R., Henshaw, M.T., and Grozinger, C.M. 2014. Shared genes related to aggression, rather than chemical communication, are associated with reproductive dominance in paper wasps (*Polistes metricus*). *BMC Genomics*. 15: 75.

Impact Factor	Toth contribution	Description
3.99	Data (50%), concept (100%) and writing (90%)	Identifies conserved genes associated with aggressive behavior across animal species

21. Jandt, J.M.\*, Tibbetts, E.A. and **Toth, A.L.** 2014. *Polistes* paper wasps: a model genus for the study of social dominance hierarchies. *Insectes Sociaux*. 61(1): 11-27.

Impact Factor	Toth contribution	Description
1.022	Concept (80%) and writing (40%)	Major review of dominance behavior in paper wasps

20. Dolezal, A.G.\* and **Toth, A.L.** 2013. Honey bee sociogenomics: A genome scale perspective on bee social behavior and health. *Apidologie*. 2013: 1-21.

Impact Factor	Toth contribution	Description
1.676	Concept (75%) and writing (50%)	Major review of the application of genomics to studies of honey bee behavior and health

19. Weiner, S.A.\*, Galbraith, D.A.+, Adams, D.C., Valenzuela, N., Noll, F.B., Grozinger, C.M., **Toth, A.L.** 2013. A survey of DNA methylation across social insect species, life stages, and castes reveals abundant and caste-associated methylation in a primitively social wasp. *Naturwissenschaften*. 100(8): 795-799.

Impact Factor	Toth contribution	Description
2.098	Data (60%), concept (100%) and writing (60%)	First study to suggest a possible association between epigenetics and social organization

18. Ament, S.A., Blatti, C., Alaux, C., Wheeler, M.M., **Toth, A.L.**, LeConte, Y., Hunt, G.J., Guzmán-Novoa, E., DeGrandi-Hoffman, G., Uribe-Rubio, J.L., Amdam, G.V., Page, R.E., Rodriguez-Zas, S.L., Robinson, G.E., and Sinha, S. 2012. Meta-analysis of brain gene expression reveals shared *cis*-regulatory mechanisms for different behavior maturation factors. *Proceedings of the National Academy of Sciences*,

USA. 109(26): E1801-10.

Impact Factor	Toth contribution	Description
9.674	Data (20%) and writing (10%)	Large scale study of brain gene expression in honey bees that utilizes a new analysis method to relate gene expression to regulatory sequences

17. Weiner, S.A.\* and **Toth, A.L.** 2012. Epigenetics in social insects: a new direction for understanding the evolution of castes. *Genetics Research International*. 2012: 609810.

Impact Factor	Toth contribution	Description
No IF	Concept (90%) and writing (50%)	Review and perspective on the potential importance of epigenetics for the evolution fo social behavior

16. Tibbetts, E.A., Skaldina, O., Zhao, V.W.+ , **Toth, A.L.**, Skaldin, M., Beani, L., and Dale, J. 2011. Geographic variation in status signals in *Polistes dominulus* paper wasps. *PLoS ONE*. 6 (12): e28173.

Impact Factor	Toth contribution	Description
4.24~	Data (20%), concept (20%) and writing (20%)	Shows a communication signal (facial color patterns) vary within a species and relate to ecological factors

15. Daugherty, T.H.F., **Toth, A.L.**, and Robinson, G.E. 2011. Nutrition and division of labor: Effects on foraging and brain gene expression in the paper wasp *Polistes metricus*. *Molecular Ecology* 20: 5337-5347.

Impact Factor	Toth contribution	Description
6.494	Data (70%), concept (90%) and writing (50%)	Experimental study demonstrating the importance of nutrition in the regulation of social behavior

14. Henshaw, M.T., **Toth, A.L.**, and Young, T.J. 2011. Development of new microsatellite loci for the genus *Polistes* from publically available expressed sequence tag (EST) sequences. *Insectes Sociaux* 58: 581.585.

Impact Factor	Toth contribution	Description
1.022	Data (50%) and writing (20%)	Demonstrates the utility of high throughput sequence data for the development of genetic markers

13. Singh, R., Levitt, A.L., Rajotte, E.G., Holmes, E.C., Ostiguy, N., vanEngelsdorp, D., Lipkin, W.I., dePamphilis, C.W., **Toth, A.L.**, and Cox-Foster, D.L. 2010. RNA viruses in hymenopteran pollinators: evidence of inter-taxa virus transmission via pollen and potential impact on non-*Apis* hymenopteran species. *PLoS ONE* 5: e14357.

Impact Factor	Toth contribution	Description
4.24~	Data (10%) and writing (5%)	First study to demonstrate that honey bee viruses have the potential to impact other insects

*Published before coming to ISU (12 total)*

12. Hunt, J.H., Wolschin, F., Mutti, N., Henshaw, M.T., Newman, T.C., **Toth, A.L.** and Amdam, G.V. 2010. Differential gene expression and protein abundance evince ontogenetic bias toward castes in a primitively social wasp. *PLoS ONE*, 5: e10674.
11. **Toth, A.L.**, Varala, K., Henshaw, M.T., Rodriguez-Zas, S.L., Hudson, M.E. and Robinson, G.E. 2010. Brain transcriptomic analysis in paper wasps identifies genes associated with division of labor across social insect lineages. *Proceedings of the Royal Society B*, 277:2139-2148.
10. **Toth, A.L.** and Robinson, G.E. 2010. Evo-devo and the evolution of social behavior: Brain gene expression analyses in social insects. *Cold Spring Harbor Symposium on Quantitative Biology*, LXXIV: 1-9.
9. **Toth, A.L.**, Bilof, K.J.+ Henshaw, M.T., Hunt, J.H., and Robinson, G.E. 2009. Lipid stores, ovary development, and gene expression in *Polistes metricus* females. *Insectes Sociaux*. 56:77-84.
8. Smith, C.R.\*, **Toth, A.L.\***, Suarez, A.V., and Robinson, G.E. 2008. Genetic and genomic analyses of the division of labour in insect societies. *Nature Reviews Genetics*, 9:735-748. \* these authors contributed equally
7. **Toth, A.L.**, Varala, K., Newman, T.C., Miguez, F.E., Hutchison, S., Willoughby, D., Simons, J.F., Egholm, M., Hunt, J.H., Hudson, M.E., and Robinson, G.E. 2007. Wasp gene expression supports an evolutionary link between maternal behavior and eusociality. *Science*, 318: 441-444. (cited in “Faculty of 1000 Biology”)
6. **Toth, A.L.** and Robinson, G.E. 2007. Evo-devo and the evolution of social behavior. *Trends in Genetics*, 23: 334-341.
5. Honey bee Genome Sequencing Consortium. 2006. Insights into social insects from the genome of the honeybee *Apis mellifera*. *Nature*, 443: 931-948.
4. Kunieda, T.\*, Fujiyuki, T.\*, Kucharski, R.\*, Foret S.\*, Ament, S.\*, **Toth, A.L.\***, Ohashi, K., Takeuchi, H. Kamikouchi, A., Kage, E., Morioka, M., Beye, M., Kubo, T., Robinson, G.E., & Maleszka, R. 2006. Carbohydrate metabolism genes and pathways in insects: insights from the honey bee genome. *Insect Molecular Biology*, 15: 563-576. \* these authors contributed equally
3. **Toth, A.L.**, Kantarovich, S.+ Meisel, A.F.+ & Robinson, G.E. 2005. Nutritional status influences socially-regulated foraging ontogeny in honey bees. *Journal of Experimental Biology*, 208: 4641-4649.
2. **Toth, A.L.** & Robinson, G.E. Nutrition and division of labor in honey bees. 2005. *Animal Behaviour*, 69: 427-435. (cited in “Faculty of 1000 Biology”)
1. Leoncini, I., Le Conte, Y., Costagliola, G., Plettner, E., **Toth, A.L.**, Wang, M., Huang, Z., Bécard J-M, Crauser, D., Slessor, K.N. & Robinson, G.E. 2004. Regulation of behavioral maturation in honey bees by a primer pheromone, *Proceedings of the National Academy of Sciences, USA*, 101: 17559-17564.

### **In review at peer-reviewed journals (1)**

- Jandt, J.M., Surayanarayanan, S., Hermanson, J., Jeanne, R.L., **Toth, A.L.** Maternal interactions influence offspring developmental fate in social wasps. In revision after first round of reviews at *Proceedings of the Royal Society B*.

### Manuscripts in preparation with nearly complete full drafts (3)

Berens, A.J.\*, Tibbetts, E.A. and **Toth, A.L.** Brain gene expression associated with facial recognition in paper wasps. Intend to submit to *Genes, Brain, and Behavior*.

Geffre, A.C.\*, Liu, R.\*, Manfredini, F. Beani, L., Kathirithamby, J., Grozinger, C.M., and **Toth, A.L.** Transcriptomics of an extended phenotype: parasite manipulation of wasp social behavior correlates with shifting expression of caste-related genes. Intend to submit to *Proceedings of the Royal Society B*.

**Toth, A.L.**, Sankarayanan, S., Brendel, V.B. Estimating the size and dynamics of the CpG DNA methylome of social insects. Intend to submit to *Genome Biology*.

### 5.2 BOOK CHAPTERS (2) AND BOOK REVIEW (1): 2 published, 1 in press

Hunt, J.H. and **Toth, A.L.** Invited book chapter in press. "Sociality in wasps". In: *Comparative Social Evolution*. Rubenstein, D.R. and Abbot, P., Editors. Oxford University Press.

**Toth, A.L.** 2010. Integrating Evolution, Development, and Behavior. In: *Encyclopedia of Animal Behavior*. Breed, M. D. & Moore, J., Editors. Academic Press, Oxford.

**Toth, A.L.** 2008. Book review: *Integrating Evolution and Development: from Theory to Practice*. *American Journal of Human Biology*, 120:739-740.

### 5.3 CITATION INDICES

Citation index	Total	Since 2011
Number of citations	3010	2088
H-index	21	21
i10-index	25	25

Reported numbers are taken from Google Scholar.

## 6. GRANTS

**Principal Investigator or Co-PI** on 16 research grants totaling \$2.44 M with \$1.99 M to my research program, \$1.83 M to my program since coming to ISU

### 6.1 COMPETITIVE RESEARCH GRANTS

#### Current Research Grants

Agency/Type	Years/Role	Title	Amount (Toth portion)
NSF-IOS Behavioral Systems	2015-2018 Co-PI (S. Rehan, PI)	Comparative genomics of very early stages in social evolution	\$494,275 (\$209,795)
Center for Global and Regional	2015-2016 PI (A. Dolezal,	Effects of chronic and acute nutritional stress on honey bee	\$30,000 (all)

<b>Environmental Change</b>	co-PI)	health	
<b>North American Pollinator Protection Campaign</b>	2015-2016 CoPI (A. Dolezal, PI)	Viral hijackers: Do viruses manipulate honey bee behavior to increase their transmission?	\$10,000 (all)
<b>Leopold Center for Sustainable Agriculture</b>	2015-2018 PI (M. O'Neal, A. Dolezal, E. Hodson, CoPIs)	Effects of landscape and on-farm diversity on the health and diversity of wild and managed bees	\$103,626 (not specified, but nearly all to Toth)
<b>United Soybean Board</b>	2014-2016 Co-PI (M. O'Neal, PI, A. Dolezal, CoPI)	Do bees benefit soybeans, and vice versa?	\$200,200 (not specified, estimate half \$100K to Toth)
<b>NSF-IOS Behavioral Systems</b>	2013-2015 PI (A. Berens, CoPI)	DISSERTATION RESEARCH: Uncovering molecular mechanisms of facial recognition using comparative transcriptomics	\$19,233 (all)
<b>NSF-IOS Behavioral Systems</b>	2012-2015 PI (R. Jeanne, CoPI)	Epigenetic, transcriptomic, and behavioral impacts of a maternal signal during wasp caste development	\$439,498 (all, includes an REU supplement)
<b>USDA-NRI Insects and Nematodes Foundational Program</b>	2012-2015 PI (B. Bonning, A. Miller, coPIs)	Interactions between honey bee nutrition and viral infection: An integrative approach to Colony Collapse Disorder	\$494,000 (all)

**Past Research Grants (grants awarded while at ISU denoted with \*)**

<b>Agency/Type</b>	<b>Years/Role</b>	<b>Title</b>	<b>Amount (Toth portion)</b>
<b>* NSF-IOS Evolution of Developmental Systems</b>	2011-2013 PI	DNA Methylation and the Evolution of Social Insect Castes	\$325,216 (all)
<b>* ISU Center for Virus-Insect Interactions</b>	2013-2014 PI (M. Harris, M. O'Neal, CoPIs)	Understanding landscape impacts on the incidence of viruses of-concern to pollinator health in honey bees and wild bees	\$38,939 (all)
<b>* University of North Carolina- Charlotte Internal Funds</b>	2011-2012	Molecular Basis for Ritualized Aggression and the Evolution of the Vibration Signal of the Honey Bee, <i>Apis mellifera</i>	\$12,000 (\$6,000)
<b>* ISU Center for Integrated Animal Genomics</b>	2010-2011 PI (X. Huang, CoPI)	The social wasp genome project: <i>de novo</i> sequencing of a key species in ecology and evolution	\$21,000 (all)
<b>USDA-NRI Insects and Nematodes Foundational Program</b>	2008-2010 PI (C. Grozinger, co-PI)	Postdoctoral fellowship: Using comparative genomics to uncover conserved mechanisms for insect reproduction and social behavior	\$125,000 (all)
<b>NSF-IOS</b>	2004-2005 CoPI (G.	DISSERTATION RESEARCH: Nutritional influences on social	\$10,000 (all)

<b>Behavioral Systems</b>	Robinson, PI)	insect division of labor	
<b>University of Illinois internal funds</b>	2002-2004 (student grants)	10 internal research and travel grants	\$21,500 in total (all)
<b>Organization for Tropical Studies</b>	2001 (student grant)	Post-course Research Grant	\$2000 (all)

## 6.2 NON-RESEARCH GRANTS

**Leader in providing funding** for three conference and/or instructional projects

<b>Agency/Type</b>	<b>Years/Role</b>	<b>Title</b>	<b>Amount</b>
<b>USDA-NIFA Conference Grant</b>	2015 PI (J. Gadau, C. Grozinger, CoPIs)	Interactions, Innovations & Insights For Pollinator Research: Cold Spring Harbor Lab. Meeting On Biology & Genomics of Social Insects	\$9550
<b>ISU, Scholarship of Teaching and Learning</b>	2014-2015 PI (A. Worthington, A. Walton, CoPIs)	Effects of independent research on attitudes toward and understanding of science: a case study with an animal behavior class and lab	\$1200
<b>ISU, Liberal Arts and Sciences Computer Advisory Committee</b>	2012 CoPI (A. Severin, G. Luecke, CoPIs)	High-performance computing resources for new training opportunities in genomic data analysis	\$17,901

## 7. ACADEMIC HONORS

**Award Recipient** of 20 awards encompassing all career stages, both internal and external

### 7.1 FACULTY AWARDS

Finalist, Women of Innovation Award, Rising Star Category, Technology Association of Iowa, 2016 (award recipient to be decided in November 2016)

Early Achievement in Research Award, College of Agriculture and Life Sciences, Iowa State University, 2014

### 7.2 POSTDOCTORAL AWARDS

USDA-NIFA Postdoctoral Fellowship Award (Grant), 2008-2010

Institute for Genomic Biology Fellows' Symposium, Post-doctoral Poster Award, 2007

### 7.3 GRADUATE STUDENT AWARDS

**National Awards**

Runner Up, International Union for the Study of Social Insects, George Eickwort Student Award, 2007

International Union for the Study of Social Insects Travel Award, 2006

P.E.O. Scholar Award; International Chapter of the P.E.O. Sisterhood (\$10,000), 2004

Entomological Society of America President's Prize for the Student Competition First Place, 10-Minute Oral Presentation, Section Cb/Cc, 2003

Entomological Society of America President's Prize for the Student Competition First Place, 10-Minute Oral Presentation, Section Cb/Cc, 2002

Honorable Mention; NSF Graduate Research Fellowship Competition, 2002

Animal Behavior Society Founder's Poster Award, 2002

### **University and Program-Wide Awards**

Procter and Gamble Doctoral Student Research Award, U. Illinois, 2006

Emerson Award for Outstanding Student in School of Integrative Biology, U. Illinois, 2006

University Fellowship from Graduate College, U. Illinois, 2005

Edwin M. Banks Award for Outstanding Student in Animal Behavior, U. Illinois, 2005

Agricultural Genome Sciences and Public Policy Program Fellowship, U. Illinois, 2003-5

Incomplete List of Teachers Rated Excellent by Students, University of Illinois, 2002 & 2003

Best Doctoral Presentation Award, Graduates in Ecology & Evolutionary Biology Symposium 2002, U. Illinois, 2002

John G. & Evelyn Hartman Heiligenstein Outstanding Teaching Assistant in Biology 120, U. Illinois, 2002

Program in Ecology & Evolutionary Biology Graduate Fellowship, U. Illinois, 2000-2001

Hudsonia Award in Environmental Science; Bard College, 1999

## **8. SCHOLARLY PRESENTATIONS**

### **8.1 PRESENTATIONS AT SCIENTIFIC CONFERENCES**

**Invited Speaker** at 31 national and international conferences, with 3 keynotes and 2 plenary

*Presented after coming to ISU (24 total)*

31. International Congress of Entomology, Symposium Speaker “*Polistes* wasps: a model for social theory in the genomic era”, Orlando, FL 2015

30. International Conference in Pollinator Biology, Health and Policy, **Plenary Speaker** “Landscape and diet diversity influence bee nutritional health”, State College, PA 2016

29. Entomological Society of America, Symposium Speaker “*Polistes* wasps as a neurogenomic model for complex behavior”, Minneapolis, MN 2015



28. Howard Hughes Medical Institute, Janelia Research Campus Conference on Behavioral Epigenetics, Invited Speaker, “DNA methylation is not associated with sociality in primitively social wasps”, Ashburn, VA 2015
27. Gordon Conference on Ecological and Evolutionary Genomics, Invited Speaker, “Genomic explorations into the evolution of social behavior using *Polistes* paper wasps”, Biddington, ME 2015
26. Templeton Foundation Conference on Organismality, Invited Speaker, “How conflict structures cooperation in paper wasps,” St. Louis, MO 2015
25. Bee Symposium, Mondavi Center for Honey and Pollination, “Interactions between nutritional stress and viruses affect honey bee health,” Davis, CA 2015
24. Cold Spring Harbor Laboratory Meeting on Biology and Genomics of Social Insects, Invited Speaker, “Genomics of *Polistes* paper wasps: Insights and opportunities for studying the evolution of sociality”, Cold Spring Harbor, NY 2015
23. Entomological Society of America, Symposium Speaker, “Epigenetics in paper wasps: insights into the evolution of sociality?”, Portland, OR 2014
22. USDA Honey Bee Forage and Nutrition Summit, Invited Speaker, “Honey bee nutritional stress: interactions between individual physiology, disease, and landscape”, Washington, DC, 2014
21. International Union for the Study of Social Insects, International Congress, **Plenary Speaker**, “Genomic and epigenetic regulation of behavior in primitively eusocial paper wasps: insights into social evolution”, Cairns, Australia, 2014
20. Gordon Research Conference on Genes and Behavior, Invited Speaker, “Epigenetics and the evolution of castes in social insects: The case of DNA methylation in primitively social wasps”, Galveston, TX, 2014
19. Entomological Society of America, Symposium Speaker, “Genomic insights into social evolution from primitively social *Polistes* wasps: Genetic toolkits, epigenetics, and novel genes“ (Note: due to illness talk was delivered by J. Jandt, postdoc in my lab), Austin, TX, 2013
18. Gordon Research Conference on Neuroethology, Invited Speaker, “Genomic mechanisms of social dominance in paper wasps”, Mt. Snow, VT, 2013
17. Arthropod Genomics Symposium, **Keynote Speaker**, “Genomics of primitively social *Polistes* wasps: insights and opportunities for understanding the genomic basis of eusociality”, South Bend, IN, 2013
16. Center for Integrative Animal Genomics Symposium, Invited Speaker, “Genomics of paper wasps: Insights into the evolution of social behavior”, Ames, IA, 2013
15. Entomological Society of America, Symposium Speaker, “Progress on the genome of the primitively social wasp *Polistes dominula*”, Knoxville, TN, 2012
14. Society for Social Neuroscience, Symposium Speaker, “Evolutionary insights from behavioral genomics of natural populations of social bees and wasps”, New Orleans, LA, 2012
13. Entomological Society of America, Symposium Speaker, “Comparative physiological and genomic analyses of sociality in bees and wasps”, Reno, NV, 2011

12. Entomological Society of America, Symposium Speaker, “Chemical and transcriptomic signatures of reproductive dominance in *Polistes* wasps”, Reno, NV, 2011
11. Ecological Society of America, Symposium Speaker, “Evolutionary insights from behavioral genomics of natural populations of bees and wasps”, Austin, TX, 2011
10. International Social Insect Genomics Research Conference, **Keynote Speaker**, BGI (formerly Beijing Genomics Institute), “Genomic insights into the evolution of sociality from primitively social wasps”, Shenzhen, China, 2011
9. Center for Integrative Animal Genomics Symposium, Invited Speaker, “Behavioral genomics in natural populations: insights into the evolution of sociality from bees and wasps”, Ames, IA, 2013
8. Entomological Society of America, Symposium Speaker, “Nutritional regulation of division of labor in social bees and wasps”, San Diego, CA, 2010

*Prior to ISU (7 total)*

7. International Union for the Study of Social Insects, International Congress, Symposium Speaker, “Conservation of gene networks associated with bee and wasp social organization,” Copenhagen, Denmark, 2010
6. Entomological Society of America, Symposium Speaker, “Genomics of behavior and sociality in non-model social insects, *Polistes* wasps,” Indianapolis, IN, 2009
5. International Congress of Entomology, Invited Oral Presentation, “Comparative genomic analyses of paper wasps and honey bees: insights into the evolution of social behavior”, Durban, South Africa, 2008
4. Behavioral Ecology of Parasitoids Workshop, **Keynote Speaker**, “Comparative genomic analyses of paper wasps and honey bees: insights into the evolution of social behavior”, Edinburgh, Scotland, 2008
3. Entomological Society of America, Symposium Speaker, “Brain gene expression patterns associated with division of labor in *Apis* and *Polistes*”, Indianapolis, IN, 2006
2. International Union for the Study of Social Insects, International Congress, Symposium Speaker, “Social regulation of foraging in *Apis* & *Polistes*: are there conserved molecular pathways?”, Washington, DC, 2006
1. International Congress of Entomology, Symposium Speaker, “Nutritional influences on age at onset of foraging and brain gene expression in honey bees”, Brisbane, Australia, 2004

**Contributed Talks** at 6 national and international conferences (*all prior to coming to ISU*)

6. International Conference on Pollinator Biology, Health, and Policy, Oral Presentation, “Conservation of gene networks regulating complex social behavior in bees and wasps”, Penn State University, University Park, PA, 2010
5. Center for Chemical Ecology/ Max Planck Institute for Chemical Ecology Minisymposium, Oral Presentation, “A genomic approach to the evolution of queen pheromones in social insects,” University Park, PA, 2009
4. Cold Spring Harbor Workshop on Honey Bee Genomics and Biology, Oral

- Presentation, “Social regulation of foraging in insects: are there conserved molecular pathways?” Cold Spring Harbor, NY, 2007
3. International Union for the Study of Social Insects, North American Section Meeting, Oral Presentation, “Division of labor and nutrition: A comparative genomics perspective“, Ft. Tontozona, AZ, 2004
  2. Entomological Society of America, Oral Presentation, “The influence of nutrition and social interactions on honey bee division of labor”, Cincinnati, OH, 2003
  1. Entomological Society of America, Oral Presentation, “Nutrition and division of labor in honey bees”, Ft. Lauderdale, FL, 2002

**Poster Presentations** at 7 national and international conferences (*all prior to coming to ISU*)

7. Center for Behavioral Neurobiology, Poster Presentation, “Transcriptomic and chemical signatures of dominance status in *Polistes metricus* wasps”, Georgia State University, Atlanta, GA, 2010
6. Gordon Conference on Genes and Behavior, Poster Presentation, “Transcriptomic and chemical signatures of dominance status in *Polistes metricus* wasps”, Ventura, CA 2010
5. Cold Spring Harbor 74<sup>th</sup> Symposium on Quantitative Biology “Evolution: the Molecular Landscape”, Poster Presentation, “Conservation of molecular pathways related to social evolution in bees and wasps”, Cold Spring Harbor, NY, 2009
4. Institute for Genomic Biology Fellows’ Symposium, Poster Presentation, “Brain gene expression patterns associated with behavior in the social wasp *Polistes metricus*”, Urbana, IL, 2007
3. Gordon Conference on Genes and Behavior, Poster Presentation, “Division of labor and nutrition: A comparative genomics perspective”, Ventura, CA, 2006
2. Gordon Conference on Neuroethology, Poster Presentation, “Nutrition and division of labor: A comparative genomics perspective”, Oxford, England, 2005
1. Animal Behavior Society, Poster Presentation, “Nutrition and division of labor in honey bees”, Bloomington, IN, 2002

**Co-Author** on over 30 poster and oral presentations by my students and postdocs at national and international conferences, *since coming to ISU in 2010*

## 8.2 INVITED SEMINARS

**Invited Seminar Speaker** for 32 seminars at regional, national, and international universities

*Presented after coming to ISU (18 total)*

32. Iowa State University Osborn Club (General science lectures), “A more perfect union: Lessons in cooperation from social insects”, 2016
31. University of Iowa, Department of Biology Seminar Series “Climbing the social ladder: Genomic insights into social evolution from bees and wasps”, 2016

29. University of California at Davis, Department of Entomology Seminar Series, “Molecular evolution in insect societies: Insights from primitively social wasps” 2015
28. Washington University in St. Louis, Department of Biology Seminar Series, “Genomics of *Polistes* paper wasps: insights and opportunities for understanding the evolution of sociality”, 2015
27. Indiana University, Department of Biology Seminar Series, “Genomic and epigenetic insights into the evolution of sociality from *Polistes* wasps”, 2014
26. University of Illinois at Urbana-Champaign, Program in Ecology, Evolution and Conservation Seminar, **Student Invited Speaker**, “Genomic insights into social evolution from primitively social *Polistes* wasps: Genetic toolkits, epigenetics, and novel genes”, 2013
25. University of Colorado, Department of Ecology and Evolutionary Biology Seminar, “Genomic insights into social evolution from primitively social *Polistes* wasps: Genetic toolkits, epigenetics, and novel genes”, 2013
24. Iowa Lakeside Laboratory, Summer Research Seminar Series, “Viruses and nutritional stress: the perfect storm for bee population declines?” 2013
23. Iowa State University, Department of Horticulture Seminar Series, “Interactions between honey bee nutritional stress and viruses: Implications for bee health and colony collapse”, 2013
22. University of Missouri, School of Biology Seminar Series, “Comparative physiological and genomic analyses of behavior in bees and wasps”, 2012
21. University of Minnesota, Department of Ecology, Evolution, and Behavior Seminar, “Comparative sociogenomics of bees and wasps: insights into social evolution”, 2012
20. University of Kentucky, Department of Entomology Seminar, “Comparative genomic analyses of social behavior in bees and wasps”, 2012
19. University of Kentucky, EcoLunch Seminar, “Can poor nutrition affect bee health and colony collapse?”, 2012
18. Kansas State University, Department of Entomology Seminar, “Comparative genomic analyses of social behavior in bees and wasps”, 2011
17. University of St. Thomas, St. Paul, Minnesota, Department of Biology Seminar, “Comparative physiology and genomics of sociality: evolutionary insights from bees and wasps”, 2011
16. University of Wisconsin, Madison, Department of Entomology Seminar, “Comparative physiology and genomics of sociality: evolutionary insights from bees and wasps”, 2011
15. Texas A&M University, Department of Entomology Seminar, “Comparative physiology and genomics of sociality in bees and wasps”, 2011
14. Iowa State University, Department of Entomology Seminar, “Comparative genomics of sociality in bees and wasps”, 2011
13. Universidade Estadual Paulista (Sao Jose do Rio Preto, Brazil), Department of Zoology and Botany, “Wasp and bee comparative genomics: Insights into social evolution”, 2011

12. Iowa State University, Bioinformatics and Computational Biology Program Seminar, “Wasp and bee comparative genomics: Insights into social evolution”, 2010

*Prior to ISU (11 total)*

11. Iowa State University, Ecology, Evolution, and Organismal Biology Departmental Seminar, “Integrative analyses of behavior in bees and wasps: insights into the evolution of sociality”, 2010
10. Georgia Institute of Technology, Biology Department Informal Seminar, “Integrative analyses of behavior in bees and wasps: insights into the evolution of sociality”, 2010
9. Emory University, Neurobiology Program “Frontiers” Seminar Series, “Integrative analyses of behavior in bees and wasps: insights into the evolution of sociality”, 2010
8. Pennsylvania State University, Department of Entomology Seminar, “What can genomics and physiology reveal about social evolution? Insights from bees and wasps”, 2009
7. University of Oregon, Center for Ecology and Evolutionary Biology Seminar, “What can genomics and physiology reveal about social evolution? Insights from bees and wasps ”, 2009
6. University of Michigan, Department of Ecology and Evolutionary Biology Seminar, “What can genomics and physiology reveal about social evolution? Insights from bees and wasps”, 2009
5. North Carolina State University, Department of Biology Seminar, “What can genomics and physiology reveal about social evolution? Insights from bees and wasps”2009
4. University of Texas at Austin, Section of Integrative Biology Seminar, ““What can genomics and physiology reveal about social evolution? Insights from bees and wasps” , 2008.
3. North Carolina State University, Department of Entomology Research Seminar, “Comparative physiological and genomic analyses of social behavior in honey bees and paper wasps“, 2007
2. The Ohio State University, Department of Entomology Seminar, “Comparative physiological and genomic analyses of social behavior in honey bees and paper wasps”, 2007
1. University of Illinois, Illinois Natural History Survey Seminar, “Genomic analyses of social behavior in a non-model species, the paper wasp *Polistes metricus*”, 2007

## **9. PROFESSIONAL AND UNIVERSITY SERVICE**

### **9.1 LEADERSHIP POSITIONS**

President (3 year term including one year as President-elect, and one year as Past-President),  
International Union for the Study of Social Insects- North American Section, 2014-  
2016

Co-President, Graduates in Ecology & Evolutionary Biology, Registered Student  
Organization, 2005-2006

## 9.2 COMMITTEE APPOINTMENTS

### Scientific Societies

Chair of Nominating Committee, International Union for the Study of Social Insects- North  
American Section, 2012

Member of Nominating Committee, International Union for the Study of Social Insects-  
North American Section, 2011

### Departmental Service

Chair of Seminar Committee, Ecology, Evolution, and Organismal Biology, 2016-present

Ecology, Evolution, and Organismal Biology Seminar Committee, ISU, 2014- present

Ecology, Evolution, and Organismal Biology Social Committee, ISU, 2010-2014

### Graduate Program Service

Chair of Curriculum Committee, Bioinformatics and Computational Biology, 2016-present

Curriculum Committee, Bioinformatics and Computational Biology, 2013-present

Chair of Curriculum Committee, Ecology and Evolutionary Biology, 2015-2016

Curriculum Committee, Ecology and Evolutionary Biology Graduate Program, 2012-present

Bioinformatics and Computational Biology Graduate Admissions Committee, 2012

### University-wide Service

DNA Facility Users Committee, ISU, 2013-present

Genome Informatics Facility Users Committee, ISU, 2013-present

University Child Care Committee, ISU, 2010- present

## 9.3 PEER REVIEWING

**Peer Reviewer** for 36 journals (more than 10 reviews per year *since coming to ISU*)

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### Journal Names

*Animal Behaviour*

*Journal of Apicultural Research*

*Annales Zoologici Fennici*

*Journal of Economic Entomology*

*Apidologie*

*Journal of Experimental Biology*

*Behavioral Ecology and Sociobiology*

*Journal of Experimental Zoology*

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<i>Biological Reviews</i>	<i>Journal of Heredity</i>
<i>Biology Letters</i>	<i>Journal of Insect Physiology</i>
<i>BMC Ecology</i>	<i>Journal of Insect Science</i>
<i>BMC Genomics</i>	<i>Journal of Invertebrate Pathology</i>
<i>Cell and Tissue Research</i>	<i>Molecular Biology and Evolution</i>
<i>Ethology</i>	<i>Molecular Ecology</i>
<i>Evolution</i>	<i>Naturwissenschaften</i>
<i>Gene</i>	<i>PLoS Genetics</i>
<i>Genetics Research International</i>	<i>PLoS One</i>
<i>Hormones and Behavior</i>	<i>Proc. of the National Academy of Sciences USA</i>
<i>Insect Molecular Biology</i>	<i>Proceedings of the Royal Society B</i>
<i>Insectes Sociaux</i>	<i>Science</i>
<i>Integrative and Comparative Biology</i>	<i>Genome Biology and Evolution</i>
<i>International Journal of Biological Sciences</i>	<i>Current Opinion in Insect Science</i>

Peer reviewer of grant proposals for NSF, USDA, Biotechnology and Biological Sciences Research Council (BBSRC)

USDA-NIFA grant proposal on-site review panelist, 2011

#### 9.4 CONFERENCE AND SYMPOSIUM ORGANIZING

International Union for the Study of Social Insects, North American Section, Section Meeting Co-organizer (with K. Kapheim, S. O'Donnell, C. Brent), September 2016

International Congress of Entomology Symposium Co-Organizer (with A. Zayed), "Evolution of insect sociality: From theory to genomes and back again", 2016

Entomological Society of America, Program Symposium Co-organizer (with S. Rehan) "Molecular Evolution in Social Insects: Insights from the synergy of natural history, diversity, and genomics", Minneapolis, MN, November 2015

Entomological Society of America, Section Symposium Co-organizer (with J. Jandt and S. O'Donnell) "Social Wasps, the model "non-model" organisms: Celebrating the synergistic contributions of Robert L. Jeanne (Professor Emeritus, University of Wisconsin-Madison)", Minneapolis, MN, November 2015

Co-organizer (with J. Gadau and G. Bloch) of an international conference on Biology and Genomics of Social Insects, Cold Spring Harbor Laboratory, 2015

Entomological Society of America, Section Symposium Co-organizer (with A. Dolezal and S.H. Woodard) "Nutrition and the health of wild and managed bees", Portland, OR 2014

Entomological Society of America, Section Symposium Co-organizer (with J. Brisson) "Epigenetics, phenotypic plasticity, and insect evolution: First insights from an emerging field", Reno, NV, 2011

## 9.5 WORKSHOP DISCUSSION PARTICIPATION

Participated in deliberations about bee health as part of NSF-funded bee sociological study (PIs: S. Suryanarayanan and D. Kleinman, at University of Wisconsin-Madison), 2013-2015

Participant in catalysis group on evolution of eusociality at NESCent (National Evolutionary Synthesis Center), 2010

Discussion leader for symposium on “Gene- behavior studies in natural populations”, Gordon Conference on Genes and Behavior, 2010

## 9.6 PROFESSIONAL MEMBERSHIPS

### Scientific Societies

Entomological Society of America, 2002- present

International Union for the Study of Social Insects, 2002- present

Animal Behavior Society, 2002-2003

Ecological Society of America, 2011-2012

### Research Workgroups

Founding Member of ISU Pollinator Working Group, 2013-present

Member of ISU Center for Virus-Insect Interactions (2011-2014)

Member of ISU Center for Integrated Animal Genomics (2010-2013)

Member of NSF Research Coordination Network: Sociogenomics, 2013-present

Member of NSF Research Coordination Network: Insect Genetic Technologies, 2013-present

Member of Center for Global and Regional Environmental Research, University of Iowa, 2014-present

## 10. OUTREACH AND PUBLIC EDUCATION

### 10.1 PUBLIC EDUCATION AND OUTREACH EVENTS

*Events since coming to ISU*

Speaker for session on “Getting Started with Bees” at Small Farms Conference, Iowa State University, 2016

Co-organizer (with N. Brockman) of Pollinator Fest, an outreach program at Reiman Gardens to celebrate and educate for National Pollinator Week, 2015 and 2016

Biodiversity field outreach “BioBlitz” leader on insect collecting and identification activities, 2012 (Iowa Wildlife Center), 2014, 2015, 2016 (Whiterock Conservancy)

Yearly Horticulture Farm Field Day; tours of Bee and Wasp Research Facility to Fruit and Vegetable Growers Association and Practical Farmers of Iowa, 2012-2015



Panel discussion on honey bee health with commodity groups, industry, and beekeepers, World Food Prize Meeting, Des Moines, IA 2014

Bayer's Bee Tour, Panel discussion participant, Ames, Iowa, 2013

Member of NSF "Portal to the Public" Program with the Science Center of Iowa, Des Moines, 2013-2014

*Prior to ISU*

Assisted with Honey Bees and Pollinators Exhibit, Great Insect Fair, Pennsylvania State University, 2009

Contributed to an exhibit on bee social behavior for the University of Illinois' Pollinarium, a museum to educate the public about the importance of pollinators, 2008

Exhibit on bees for University of Illinois' National Pollinator Week, 2008

Created an informational webpage on bee social behavior for inclusion in "Beespotters", a web interface for the monitoring of bee populations in Illinois, 2008

## 10.2 NON-TECHNICAL LECTURES

*Since coming to ISU*

Beta Beta Beta Fraternity, Guest lecture on social insects, planned for November 2016

Undergraduate Entomology Club, ISU, 2015

Iowa Honey Producers' Association, Regular lectures at annual meetings in Marshalltown, IA, 2012, 2013, 2014

Science Center of Iowa's "Café Scientifique", Non-technical talk on social insects, Des Moines, Iowa, 2013

Central Iowa Beekeepers' Association, Informal Research Presentation, 2012

"Day of Insects" at Reiman Gardens, Lecture on social insects, Ames, IA 2011

Undergraduate Biology Club, ISU, 2010

*Prior to ISU*

Northern Illinois Beekeepers' Association, Nontechnical research presentation, 2005

Indiana State Beekeepers' Association, Nontechnical research presentation, 2003

Illinois State Beekeepers' Association, Nontechnical research presentation, 2002

## 10.3 PRESENTATIONS TO SCHOOL GROUPS

*Since coming to ISU*

Interactive presentation on honey bees to 1<sup>st</sup> grade class, Sawyer Elementary School, Ames, IA, 2014

Provided annual tours of my research facilities to Ames High School Biology classes, Junior Lego League, Agricultural Leadership Program high school students, 2013-2016

Discussion with NSF Research Experiences for Teachers Participants on evolution

education, 2012

Pollinator presentation to preschool class at ISU Child Development Laboratory, 2012

*Prior to ISU*

“Insects and Bees” presentation to 1st-5th graders, St. Mary’s School, Chicago, IL, 2004

“Bees and Wasps” exhibit at Orpheum Children’s Museum, Champaign, IL, 2004

“Evolution and Genetics in Bees” presentation to middle schoolers, BeeSpace Education Outreach, University of Illinois, 2007

After-School Bee Program for K-5 Students, Washington Elementary School, Champaign, IL, 2005

#### 10.4 MEDIA FEATURES

Featured scientist for podcast series “The People Behind the Science”, available at <http://www.peoplebehindthescience.com/dr-amy-toth/>, 2014

Interviewed about bee health and pollinator population declines for local radio stations including WHO in Des Moines and Iowa Public Radio, 2013-2014

Interviewed and/or research featured in newspapers and magazines (including *Ames Tribune*, *Crops and Soils*, *Visions*, *The Grower*, *Wired*), 2010-2014