Name: **Carl J. Schmidt**

Address   Department of Animal and Food Sciences
University of Delaware
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Education:

Johns Hopkins University	Ph.D.	1985	Molecular Biology
University of Delaware	B.A.	1979	Biology and Chemistry

Postdoctoral Training:

Harvard Medical School	1988-1989	Dr. Eva J. Neer	Signal Transduction
Harvard Medical School	1985-1988	Dr. Margaret Livingstone	Signal Transduction

Employment:

University of Delaware	Animal & Food Science	Professor	2013 - current
University of Delaware	Animal & Food Science	Associate Professor	2003-2013
University of Delaware	Animal & Food Science	Assistant Professor	1997-2003
Smithkline Beecham	Molecular Diagnostics	Investigator	1994-1997
Harvard Medical School	Department of Medicine	Assistant Professor	1992-1994
Harvard Medical School	Department of Medicine	Instructor	1989-1992

Refereed Publications (since promotion to Associate Professor):

1. John A. St. John and 48 others (2012). Sequencing three crocodilian genomes to illuminate the evolution of archosaurs and amniotes. Genome Biology 13, http://genomebiology.com/2012/13/1/415. **Contributions to Work: Dr. Schmidt designed and developed the informatics pathways for gene annotation and pathway prediction.**

2. Son A, Schmidt CJ, Shin H, Cha DK. (2011) Microbial community analysis of perchlorate-reducing cultures growing on zero-valent iron. J Hazard Mater. 2010 Jan 30;185(2-3):669-76. Epub 2010 Sep. **Contributions to Work: Dr. Schmidt worked closely with the other authors to design the experiments and evaluate the results. Edited the text.**

3. Tudor CO, Schmidt CJ, Vijay-Shanker K (2010).eGIFT: mining gene information from the literature. BMC Bioinformatics. 2010 Aug 9;11:418. **Contributions to Work: Dr. Schmidt worked closely with Dr Tudor and Shanker to develop this tool including participating in validation. Co-wrote and edited the text.**

4. Dalloul RA, and 68 others. (2010) Multi-platform next-generation sequencing of the domestic turkey (Meleagris gallopavo): genome assembly and analysis.

PLoS Biol. 2010Sep 7;8(9). **Contributions to Work: Dr. Schmidt designed and developed the informatics pathways for gene annotation and pathway prediction. Edited the text.**

5. C.J. Schmidt, M.E. Persia, E. Feierstein, B. Kingham, W.W. Saylor (2009). Comparison of a Modern Broiler Line and a Heritage Line Unselected Since the 1950's. Poultry Science. 88: 2610-2619. **Contributions to Work: Dr. Schmidt designed experiments in collaboration with Drs. Saylor and Persia, analyzed all data, wrote and edited the manuscript. Corresponding author.**

6. Li Jin, Decker, K.S., Stachnik, A.J. , Schmidt, C.J. (2009) Prediction of Biological Pathways with Integrated Information. IEEE International Conference on Bioinformatics and Biomedicine Workshop, 2009. DOI: 10.1109/BIBMW.2009.5332067. **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop user interface. Edited manuscript.**

7. Li Jin, Keith Decker and Carl J. Schmidt (2009) BioPlanner A Plan Adaptation Approach for the Discovery of Biological Pathways across Species. Artificial Intelligence 2009: 99-106. . **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop user interface. Edited manuscript.**

8. David W Burt, Wilfrid Carrë, Mark Fell, Andy S Law, Parker B Antin, Donna R Maglott, Janet A Weber, Carl J Schmidt, Shane C Burgess, Fiona M McCarthy (2009) The chicken gene nomenclature committee report. BMC Genomics doi:10.1186/1471-2164-10-S2-S5. **Contributions to Work: Contributed to developing guidelines for nomenclature assignment, edited the manuscript.**

9. Carl J. Schmidt, Michael Romanov, Oliver Ryder, Vincent Magrini, Matthew Hickenbotham, Jarret Glasscock, Sean McGrath, Elaine Mardis, and Lincoln D. Stein (2008) Gallus GBrowse: a unified genomic database for the chicken. Nucleic Acids Res. 2008 January; 36(Database issue): D719–D723. **Contributions to Work: Developed Gallus Gbrowse resource, wrote and edited the manuscript. Corresponding author.**

10. Anobile, J., Arumugaswami, V., Downs, D., Czymmek, K., Parcells, M., and Schmidt, C.J. (2006) Nuclear Localization and Dynamic Properties of the Marek's Disease Virus Oncogene Products Meq and Meq-vIL8. J. Virology 80 1160-1166. **Contributions to Work: Directed experiments in collaboration with Dr. Parcells. Analyzed data, developed figures. Wrote and edited the manuscript in collaboration with Dr. Parcells. Corresponding author.**

11. Jin, L., Steiner, K., Schmidt, C.J., Situ, G., Kamboj, S. Kay T. Hlaing, Morgan Conner, Heebal Kim, Marlene Emara, and Keith S. Decker (2005) "A Multiagent

Framework to Integrate and Visualize Gene Expression Information" IEEE-ICDM Workshop on Multiagent Data Warehousing and Multiagent Data Mining, pp. 1-7. **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop user interface. Edited manuscript.**

12.   Karaca, G., Anobile, J., Downs, D., Burnside, J., and Schmidt, C.J. (2004) Herpesvirus of Turkeys: Microarray Analysis of Host Gene Responses to Infection. *Virology*. 318, 102-111. **Contributions to Work: Designed experiments, analyzed data, wrote and edited the manuscript. Corresponding author.**

13.   Abdel Aouacheria, Michelle Banyai, Dominique Rigal, Carl J. Schmidt and Germain Gillet (2003) Characterization of *vNr-13*, the first alphaherpesvirus gene of the *bcl-2* family, *Virology,* 316, 256-266*.* **Contributions to Work: Help design experiments and provided plasmid vectors for analysis. Edited manuscript.**

14.   S. Khan, G. Situ, K. Decker, and C.J. Schmidt. (2003) GO-Figure: a tool to visualize automated Gene Ontology annotation. *Bioinformatics*. 12, 2484-2485. **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop user interface. Edited manuscript.**

15.   H. Kim, C.J. Schmidt, K.S. Decker and M.G. Emara. (2003) A double-screening method to identify reliable candidate non-synonymous SNPs from chicken EST data. *Animal Genetics*. 34, 249-254. **Contributions to Work: Contributed to development of analysis pipeline, edited manuscript.**

16.   S. Khan, R. Makkena, F. McGeary, K. Decker, W. Gillis, and C.J. Schmidt. (2003) A Multi-Agent System for the Simulation of Biological Networks. In *Proceedings of the International Conference on Autonomous Agents and Multi-Agent Systems*, 2003. **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop analytical interface. Edited manuscript.**

17.   S. Khan, K. Decker, W. Gillis, and C.J. Schmidt.(2003) A Multi-Agent System-driven AI Planning Approach to Biological Pathway Discovery. In *Proceedings of the International Conference on Automated Planning*, 2003. **Contributions to Work: Provided essential background on biological pathways, worked closely with students to develop analytical interface. Edited manuscript.**

18.   Decker, K., Khan, S., Schmidt, C.J. Situ, G., Makkena, R., Michaud, D., (2002) Biomas: A multi-agent system for genomic annotation. *International Journal of Cooperative Information Systems*. 11, 265-292.

19. O'Donnell, L.A., Clemmer, J.A., Czymmek, K., and Schmidt, C.J. (2002) Marek's Disease Virus VP22: Subcellular Localization and Characterization of Carboxyl Terminal Deletion Mutations. *Virology* 292, 235-240.

20. Decker, K., Khan, S,. Schmidt, C.J., Michaud. D.,(2001) Extending a Multi-Agent System for Genomic Annotation. *Workshop on Cooperative Information Agents*, Modena, Italy. LNAI 2182, Springer-Verlag

21. Decker, K., Zheng, X. and Schmidt C.J. SPT: A Multi-Agent System for Automated Genomic Annotation (2001) *Automated Agents*. 5, 433-440.

22. Kingham, B.F., Zelnik, V., Kopaek, J., Majeriak, V., Ney, E., and Schmidt, C.J. (2001) Genome Sequence of Herpesvirus of Turkeys: Comparative Analysis with Marek's Disease Viruses. *J. Gen Virol.* 82, 1123-1135.

23. Drmanac, S., Kita, D., Labat, I., Hauser, B., Schmidt, C., Burczak, J.D. and Drmanac, R. (1998) Accurate sequencing by hybridization for DNA diagnostics and individual genomics. *Nature* Biotechnology 16, 54-58.

24. Rasio, D., Murakumo, Y., Robbins, D., Roth, T., Silver, A., Negrini, M., Schmidt, C.J., Burczak, J., Rishel, R., and Croce, C.M. (1997) Characterization of the Human Homologue of RAD54. *Cancer Research* 57, 1378-1383.

25. Mende, U, Schmidt, C.J., Yi, F., Spring, D.J. and Neer, E.J. (1995) The G protein g Subunit: Requirements for Dimerization with b Subunits. *J. Biol. Chem.* 270, 15892-15898.

26. Neer, E.J., Schmidt, C.J. Nambudripad, R. and Smith, T.F. (1994) The ancient regulatory-protein family of WD-repeat proteins. *Nature* 371, 297-300.

27. Neer, E.J., Denker, B.M., Thomas, T. C., and Schmidt, C.J. (1994) Analysis of G-Protein a and bg Subunits by in Vitro Translation. *Methods in Enzymology* 237, 226-239.

28. Schmidt, C.J. Zubiaur, M., Valenzuela, D., Neer, E.J. and Drager, U.C. (1994) G_o, A Guanine Nucleotide Binding Protein, is Expressed During Neurite Extension in the Embryonic Mouse. *J. Neuroscience Research.* 38: 182-187.

29. Neer, E.J. , Schmidt, C.J. and Smith, T. (1993) LIS is more *Nature* (Genetics) 5, 3-4

30. Schmidt, C.J. and Sladek, T.E. (1993) A Rat Homolog of the Drosophila Enhancer of split (groucho) Locus Lacking WD-40 Repeats. *J. Biol. Chem* 268: 25681-25686.

31. Thomas, T.C., Schmidt, C.J. and Neer, E.J. (1993) G Protein α_o Subunit: Mutation of Conserved Cysteines Identifies a Subunit Contact Surface and Alters GDP Affinity. *Proc. Natl. Acad. Sci. USA* 90: 10295-10299.

32. Schmidt, C.J. , Thomas, T., Levine, M.A., and Neer, E.J. (1992) Specificity of G Protein Beta and Gamma Subunit Interactions. *J. Biol. Chem.* 267: 13807-13811.

33. Denker, B.D., Schmidt, C.J. and Neer, E.J. (1992) Promotion of the GTP-Liganded State of the G_o-Alpha Protein by Deletion of the Carboxy Terminus. *J. Biol. Chem.* 267: 9998-10002.

34. Denker, B.D., Neer, E.J. and Schmidt, C.J. (1992) Mutagenesis of the amino terminus of the a subunit of the G Protein Go. *J. Biol. Chem.* 267: 6272-6277.

35. Schmidt, C.J. and Neer, E.J. (1991) *In Vitro* synthesis of G protein bg dimers. *J. Biol. Chem.* 266: 4538-4544.

36. Garen-Fazio, S., Neer, E.J. and Schmidt, C.J. (1991) Identification of a retinal protein in *Drosophila* with an antibody to the alpha subunit of bovine brain G_o protein. *J. Comp. Neurology* 309: 17-26.

37. Schmidt, C.J., Garen-Fazio, S., Chow, Y.K. and Neer, E.J. (1989) Neuronal expression of a newly identified *Drosophila* G-Protein alpha subunit. *Cell Regulation* 1: 125-134.

38. Jung, G., Schmidt, C.J. and Hammer, J.A. (1989) Myosin I heavy chain genes of Acanthamoeba: Cloning of a second gene and evidence for existence of a third gene. *Gene* 82: 269-280.

39. Schmidt, C.J., Jubier, M.F. and Hamer, D.H. (1986) Cell specificity and effect of *ras* on human metallothionein gene expression. *Proc. Natl. Acad. Sci.* USA. 83: 3346-3350.

40. Carter, A.D., Felber, B.K., Walling, M.J., Jubier, M.F., Schmidt, C.J. and Hamer, D.H. (1985) Duplicated heavy metal control sequences of the mouse metallothionein I gene. *Proc. Natl. Acad. Sci. USA.* 81: 7392-7396.

41. Schmidt, C.J., Hamer, D.H. and McBride, O. W. (1984) Chromosomal location of human metallothionein genes: Implication for Menkes' Disease. *Science* 224: 1104-1106.

42. Schmidt, C.J. and Hamer, D.H. (1983) Cloning and sequence analysis of two monkey metallothionein cDNAs. Gene 24: 137-146.

43.   Ross, J.B.A., Schmidt, C.J., and Brand, L. (1981) Time resolved fluorescence of two tryptophans in horse liver alcohol dehydrogenase. *Biochemistry* 20: 4369-4377.

Patents:
Schmidt, Carl J., Tobin, Frank, and Wilkinson, Francis E. (1998) Method of Diagnosing and Monitoring Prostate Cancer. Patent Number: 5,747,264.

Schmidt, Carl J., Tobin, Frank, and Wilkinson, Francis E. (1999) Method of Diagnosing and Monitoring Cancer. Patent Number: 5,942,402 .

Schmidt; Carl J and Wang; Xin-Min. (2003) Method of detecting and treating cancer: endometrial steroid binding protein II Patent Number: 6,667,291.

Professional Activities:

Peer Reviews: (Journals) Animal Genetics: BMC Genomics: Journal of Proteomics and Bioinformatics: Genes, Genomics and Genetics; Virology; Virology Research

Editorial Board: Frontiers in Livestock Genomics (Review Editor).

Peer Reviews (Grants): NIFA 2012

Organizing Committees:
6th International Chick Meeting (2011) Edinburgh, Scotland Co-chair Database and Resources Section.
Avian Genomics and Gene Ontology Workshop (2010) Mississippi State University

Committee Service: Graduate Student Advisory Committee (2003-present); Department Promotion and Tenure Committee (2009-2010, chair); College Promotion and Tenure Committee (2005); University Bioinformatics Steering Committee (2009-present); Bioinformatics Graduate Committee (2009 – Present)

Graduate Students Trained:
Catalina Oana Tudor 2011 Ph.D. Thesis Title: Using Text Mining Techniques to Gather Gene-Specific Information from the Biomedical Literature. Co-Advisor with: K Vijay-Shanker

Li Jin 2011 Ph.D. thesis title: Exploring incomplete planning domain knowledge through hypothesis generation and diagnostic execution.

Jon Anobile (M.S.). 2004. Thesis Title: *Characterization of a Marek's Disease Virus Oncoprotein.*

Gamze Karaca (M.S.) 2004. Thesis Title: *Microarray Analysis of Host Response to Infection With Herpesvirus of Turkeys.*

Meighan Brady (M.S.) 2002. Thesis Title: *Microarray Comparison of Host Response to Infection With Different Strains of Marek's Disease Virus.*

Michael Weber (M.S.) 2002 Thesis Title: *Microarrays to Profile Host Gene Expression Patterns in Response to Infection with Herpesvirus of Turkeys.*

Current Graduate Students:
 Brooke Aldrich (M.S.) Expected completion 2013
 Rick Davis (Ph.D.) Expected Completion 2015
 Janet De Mena (M.S.) Expected completion 2013
 Liang Sun (Ph.D.) Expected completion 2014
 Shurnevia Strickland (M.S). Expected completion: 2013

Doctoral Graduate Committees:
Heebal Kim (Ph.D.) 2003 Thesis Title: *Use of EST Data to Characterize Genetic Parameters in the Chicken Gallus gallus.* Advisor: Dr. Marlene Emara. University of Delaware.

Xinhui Li (Ph.D.) 2004 Characterization of Marek's Disease Virus Serotype 1 PP38 Gene Product. Advisor: K. A. Schat Cornell University.

Abdel Aouacheria (Ph.D.) 2002 Thesis Title: *Characterization of vNr-13, the first alphaherpesvirus gene of the bcl-2 family.* Advisor: Dr. Germain Gillet. CNRS-Universite Claude Bernard.

Jianshan Tang (Ph.D.) 2001 Thesis Title: *Characterization of Truncated Testis Specific Prolactin Receptors in the Chicken Gallus Gallus.* Advisor: Dr. Larry Cogburn. University of Delaware.

Jing Cui (Ph.D.) 2000 Thesis Title: *Global Patterns of Thymic T-Cell Gene Expression in the Developing Chick Thymus and in Response to Marek's Disease Virus Vaccines.* Advisor: Dr. Joan Burnside. University of Delaware.

Jennifer Kent (Ph.D.) 2000 Thesis Title: I*solation of a Marek's Disease Virus Glycoprotein C-negative Mutant and Regulation of Major Histocompatibility complex Molecules During MDV Infection.* Advisor: Dr. Robin Morgan. University of Delaware.

Masters Graduate Committees:
Romulo Gabriel (M.S.) 2008 Thesis Title: Analysis of chicken embryonic surfactant and collectin mRNA expression.

Christine Bloom (M.S.) 2003. Thesis Title: *Gene Expression Profiles: In Ovo vs. Subcutaneous Vaccination Protocols for Marek's Disease.* Advisor: Dr. Joan Burnside. University of Delaware.

Anjana Agarwal (M.S.) 1998. Thesis Title: <u>Sequence Analysis of a 5.6 KB SACI Fragment of Infectious Laryngotracheitis Virus Which Contains the Glycoprotein C Gene.</u> Advisor: Dr. Calvin Keeler. University of Delaware.

<u>Undergraduate Honors Theses</u>:
Laura Wertman (2011) Thesis Title: Evolution of the Avian Urea Cycle.
Jessica A. Urbonas (2004) Thesis Title: *Mutations of the Marek's Disease Virus Meq Oncogene.*

Jessica A. Urbonas (2004) Thesis Title: *Mutations of the Marek's Disease Virus Meq Oncogene.*

Jonathan Anobile (2002) Thesis Title: Interaction of Marek's Disease Virus VP22 Gene Product.

William Gillis (2002) Thesis Title: *Mapping Apoptotic Signal Transduction Pathways using Novel Computer Science Techniques.*

Michelle Kern: (2001) Thesis Title: *Characterization of the Subcellular Localization of the Herpesvirus of Turkeys vNR-13 Gene Product.*

Lauren O'Donnell (2000) Thesis Title: *Marek's Disease Virus VP22: Subcellular Localization and Characterization of Carboxyl Terminal Deletion Mutations.*

<u>Meeting Abstracts and Posters</u>:
Shurnevia J. Strickland, Chris Ashwell, Mike E Persia, Max F. Rothschild, Susan J Lamont, and Carl J. Schmidt. <u>Comparative Transcriptome Analysis of Chicken Heart Gene Expression Patterns Between a Modern Broiler and a Heritage Line</u>. Plant and Animal Genome Meeting. San Diego Ca. January 14-18 2012.

Janet de Mena, Alicia M. Greenwalt, and Carl J Schmidt. <u>Insight into human directed selection through comparison of gene expression patterns between modern and heritage chicken lines,</u> Plant and Animal Genome Meeting. San Diego Ca January 14-18 2012.

Liang Sun, Chris Ashwell, Mike E Persia, Max F. Rothschild, Susan J Lamont, and Carl J. Schmidt. <u>Transcriptome Analysis of Broiler Chicken Liver as a Function of Heat Stress</u> Plant and Animal Genome Meeting San Diego Ca January 14-18 2012.

Michael Kaiser, Erin E. Sandford, Chris Ashwell, Mike E Persia, Max F. Rothschild, Carl J. Schmidt, and Susan J Lamont. <u>Physiological differences among chicken breeds in response to embryonic thermal conditioning and post-hatch heat stress.</u> Plant and Animal Genome Meeting San Diego Ca. January 14-18 2012.

McCarthy F.M., Schmidt C., Antin P. and Burgess S.C. BirdBase Update: Progress towards standardized gene nomenclature and tissue specific gene expression. Poultry Workshop, Plant and Animal Genome XX Conference January 14-18, 2012. San Diego, California.

Carl Schmidt, Philippe Chouvarine, Tim Keeler, Li Jin, Keith Decker, Veronica Shamovsky, Peter D'Eustachio, Shane Burgess, Parker Antin, Fiona McCarthy. Birdbase: A Database of Avian Genes and Genomes. 6th International Chick Meeting, Sept. 17-20 Edinburgh Scotland.

Carole Nail, Philippe Chouvarine, Janet Weber, Yachi Spencer, Swati Kumari, Shane Burgess, Carl Schmidt, Parker Antin, Fiona McCarthy. Manual biocuration to support standardized chicken gene nomenclature at CGNC. The 6th International Chick Meeting Roslin Institute, Sept. 17-20, 2011.

Richard Crooijmans, Mark Fife, Tomas Fitzgerald, Carl Schmidt, Hans Cheng[6], Pete Kaiser, Richard Redon, Martien Groenen. Global Variation In Copy Number In The Chicken Genome. Plant and Animal Genome Meeting. San Diego Ca. January 13-17, 2011.

Carl J Schmidt, Catalina O Tudor, Li Jin, Keith S. Decker, Fiona McCarthy, Peter D'Eustachio, K-Vijay Shanker. Bioinformatics Tools For Avian Genomics. Plant and Animal Genome Meeting San Diego Ca. Jan 14-18, 2009.

Catalina O Tudor, Carl J Schmidt, and K Vijay-Shanker, *eGIFT*: Mining gene-related information from biomedical literature. International Conference on Bioinformatics and Biomedicine BIBM 2009, Washington DC, USA, November 2009

Catalina O Tudor, Carl J Schmidt, and K Vijay-Shanker, Mining for Gene-Related Key Terms: Where Do We Find Them? Third International Symposium on Semantic Mining in Biomedicine SMBM 2008, Turku Finland, September 2008.

Catalina O Tudor, K Vijay-Shanker, and Carl J Schmidt, Mining the Biomedical Literature for Genic Information, BioNLP Workshop in conjunction with ACL-2008, Columbus Ohio, June 2008.

Catalina O Tudor, Carl J Schmidt, and K Vijay-Shanker, e-GIFT - Extracting Gene Information From Text, Delivering Value from Avian Genomics, Starkville Mississippi, May 2008.

Carl J. Schmidt, Keith Decker, Gang Situ, Ravi Makkena, Salim Khan.   A Knowledge Base for Expressed Sequence Tags. Plant and Animal Genome Meeting. Jan, 2004

Instruction Activities:
Principles of Plant and Animal Genetics ANFS300 2003 – present

Principles of Plant and Animal Genetics Laboratory ANFS310 2003-present

Bioinformatics ANFS644 1998-present (not 2006 – on sabbatical)

Introduction to Animal Science Laboratory ANFS111 2005-current (4 classes/semester)

Invited Presentations:
Recent improvements in Bioinformatics Resources for the Chicken (November, 2010) Mississippi State University.

eGIFT: A text-mining and knowledge extraction tool for curators. (July, 2010) International Society for Animal Genetics Meeting Edinburgh, Scotland.

Bioinformatics Resources for the Chicken. (June, 2010) Interdepartmental Program in Bioinformatics and Computational Biology. Iowa State University, Ames IA.

Evolution of the Modern Chicken (February, 2009) Department of Animal and Avian Sciences University of Maryland College Park, MD

Localization and Kinetics of Nuclear Meq and Meq/vIL8 (September 2005) Chicken Genome Biology and MDV Pathology Symposium. University of California, Davis.

Funding History

Federal Funding:

National Science Foundation:
PathBubbles for Dynamic Visualization and Integration of Biological Information (2012-2015) $430,413 Carl J. Schmidt P.I.

Genome Structure And Evolution In Crocodylia (2010-2012) $997.091 David Ray P.I. Carl J. Schmidt co-PI

A Knowledge Base for Storage and Analysis of Expressed Sequence Tags (ESTs) (2001-2005) $538,312 Carl J. Schmidt P.I.

USDA/NIFA
Adapting Chicken Production to Climate Change Through Breeding(2011-2015) $4,800,000 Carl J. Schmidt PI.

Knowledge Extraction and Annotation in a Grid Based Bioinformatics Environment (2008-2011) $1,000,000 Carl J. Schmidt P.I

Undergraduate Experimental Learning in Agriculture: Genomics and Bioinformatics (2004-2007) $99,999 Carl J. Schmidt P.I.

Knowledge Representation Resources for Animal Agriculture Researchers (2011-2014)

$733,845 Fiona McCarthy P.I. Carl J. Schmidt co-P.I.

Total Federal Funding as P.I.: $6,868,724.00

University of Delaware
Avian Biosciences Center: Gallus Gene Expression Atlas (2008) $30,000 Carl J. Schmidt P.I.

Avian Biosciences Center: Genes and Traits Selected During Evolution of the Modern Broiler Chicken (2006) $18,970 Carl J. Schmidt and William Saylor co-P.Is.