

## SUSAN M. MOTCH-PERRINE, PH.D.

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### EDUCATION

- The Pennsylvania State University, University Park, PA **2010 – present**  
**Postdoctoral Scholar in the lab of Professor Joan Richtsmeier**  
Current Project: Midface and Upper Airway in Craniosynostosis  
PI: Joan T. Richtsmeier
- The Pennsylvania State University, University Park, PA **2010**  
**Ph.D. in Physiology**  
Dissertation: Midi mouse as a novel model for investigating IGF-1 in aging
- The Pennsylvania State University, University Park, PA **2004**  
**M.S. in Animal Sciences**  
Thesis: Yearling horse ingestive behavior and social interaction in three concentrate feeding systems
- The Pennsylvania State University, University Park, PA **2002**  
**B.S. in Animal Sciences, with Distinction**  
Areas of Concentration: Animal nutrition, metabolism, and reproduction  
Minor: Equine Sciences

### TEACHING EXPERIENCE

- The Pennsylvania University, University Park, PA **2013**  
**Thesis Advisor to Meredith Rouston, Dept. of Engineering Science and Mechanics**  
Project: Quantitative analysis of soft tissue volumes in a murine model of Muenke Syndrome: FGFR3-related craniosynostosis
- The Pennsylvania State University, University Park, PA **2013 – present**  
**Project Supervisor to Katie Rhodes, Dept. of Anthropology**  
Project: Skull morphology of newborn (P0) Muenke Syndrome model mice
- The Pennsylvania State University, University Park, PA **2010**  
**Instructor of Anatomy, Dept. of Biology**  
Designed and delivered daily (M-F) lectures focusing on mammalian anatomy with special reference to man in a highly intensive six week course (**Biology 129, Mammalian Anatomy**) which provided an overview of anatomy from gross to histological level. Laboratory exercises included the use of real and medical grade skeletal and anatomical models; clay sculpting and positioning exercises to become versed in organization of musculature, nervous system, circulatory system, and major organs; feline dissection. Evaluated and monitored student progress via examinations.
- The Pennsylvania State University, University Park, PA **2009 - 2010**  
**Graduate Teaching Assistant, Dept. of Biology**
- **BIOL 473: Laboratory in Mammalian Physiology**, supervised by Dr. John Waters. Instructed two sections of students in experiments demonstrating fundamentals in physiology. Animal and human models used in course.
  - **BIOL 142: Physiology Laboratory**, supervised by Dr. John Waters. Instructed three sections of students in experiments demonstrating basic physiologic concepts with special reference to man. Animal and human models used in course.
- The Pennsylvania State University, University Park, PA **2003 - 2004**  
**Supervised College Teaching Experience, Dept. of Dairy & Animal Sciences**
- **AN SC 420: Advanced Nutrition and Feed Technology**, supervised by Dr. Harold Harpster. Lectured during equine section of course and during instructor absences, held office hours, created new laboratory and homework assignments for equine portion of course, assisted with all laboratories including use of various ration development software packages for cattle, horses, sheep, poultry and swine.

The Pennsylvania State University, University Park, PA

**Graduate Teaching Assistant, Dept. of Dairy & Animal Sciences**

**2002 - 2004**

All courses listed below supervised by Dr. Nancy Diehl, M.S., V.M.D.

- **AN SC 297: Special Topics Course: Equine Marketing**, which culminated in open auction of two year old Penn State bred and raised Quarter Horses
- **AN SC 307: Introduction to Horse Production**, lecture and hands on laboratory
- **AN SC 407: Advanced Horse Production**, lecture and hands on laboratory
- **AN SC 447: Applied Equine Behavior**, lecture and hands on individual or pair research experiments and hands on laboratories

The Pennsylvania State University, University Park, PA

**Undergraduate Teaching Assistant, Dept. of Dairy & Animal Sciences**

**1997-1998**

- **AN SC 001: Introduction to Animal Sciences Laboratory**, supervised by Mr. Dale Olver, M.S. Individually or team taught lab for three consecutive semesters. Live animal (mouse, rat, chicken), meat, egg, milk, and forage experiments.

**WORK EXPERIENCE**

The Pennsylvania State University, University Park, PA

**Postdoctoral Research Assistant, Biological Anthropology, Lab of Dr. Joan T. Richtsmeier**

**2010 – present**

- Focus: Physiology and Genetics of Craniofacial Synostosis with Particular Interest in Development and Dysmorphology
- Research syndromes specific to humans affected by mutations of the FGF signaling pathway and associated receptors including Apert, Crouzon, Muenke and Beare-Stevenson Syndromes using data collected from humans, primates, and mice.
- High resolution Magnetic Resonance Microscopy (MRM) and Computed Tomography (CT) scan analysis and superimposition using advanced mathematical and morphometric techniques to determine effects of treatment and aging in affected individuals, and differences in growth patterns between affected and unaffected individuals.
- Perform statistical analysis of data; write publications directed toward peer reviewed journals and abstracts for suitable conferences.
- Evaluation of animal models, software, and methodologies prior to developing grant applications
- Assist in graduate and undergraduate project development and management
- Maintain database of murine specimens and drug inventory
- Provide back-up to mouse colony coordinator

The Pennsylvania State University, University Park, PA

**Research Technician I, Center for Developmental and Health Genetics, Lab of Dr. Roger McCarter**

**2008 – 2009**

- Full time research technician while pursuing graduate study part time. We operated a specific pathogen-free barrier facility and clean conventional laboratories primarily investigating the effects of metabolic stress induced by caloric restriction or changes in plasma hormone levels in heterogeneous stock or genetically manipulated mice.
- Wrote standard operating protocols for laboratory experiments and practices. Developed new techniques for assaying heat shock proteins. Attended informational sessions on new products and procedures, report backed to primary investigator on potential uses.
- Obtained protocol approval from the Institutional Animal Care and Use Committee for experiments involving animal subjects as appropriate.
- Carried out live animal experiments in mice; whole body metabolic measurements; physical activity monitoring; collected and processed blood and tissue samples; performed survival surgeries; sacrificed animals as required for experimental endpoints.
- Data collection and management, statistical analysis.
- Responsible for Hazardous Chemical Inventory in two laboratory rooms.
- Maintained general laboratory inventory, supply requisition.
- Assisted with grant application processes.

The Pennsylvania State University, University Park, PA

**Staff Assistant VII, Dept. of Astronomy & Astrophysics**

**2008**

- Directly supported two Assistant Department Heads (Graduate Programs and Undergraduate Programs) and the Graduate Recruitment Officer, with backup support to Department Head as needed. Acted as departmental liaison to the Penn State Graduate School, Eberly College of Science Research and Grants Office, and Eberly College of Science Dean's Office.

- Created and maintained databases for student tracking. Created Data Warehouse SQL queries of University databases, populated departmental databases, analyzed data and created reports for University and outside sources.
- Prepared, submitted, and approved ERS (Employee Reimbursement System), IBIS (University Financial Mainframe), and ISIS (University Student Mainframe) forms as appropriate.

The Pennsylvania State University, University Park, PA

**Staff Assistant VI, Penn State School of Visual Arts (SoVA)**

**2005 - 2008**

- Graduate and undergraduate program staff assistant for all studio concentrations while taking graduate courses part-time. Provided staff support to a community of over 44 faculty members, 500 undergraduate and graduate students, and visiting artists. Provided back up to digital media concentration staff. Acted as departmental liaison to the Penn State Graduate School, College of Arts and Architecture Research and Grants Office, and College of Arts and Architecture Undergraduate Dean's Office.
- Nude Model Supervisor – Responsible for the advertising of open nude modeling positions, interviewing, hiring, training models, and overseeing all aspects of modeling for classes requiring models while maintaining high level of confidentiality.

The Pennsylvania State University, University Park, PA

**University Graduate Fellow, Intercollege Graduate Degree Program in Physiology**

**In Lab of Dr. Ramesh Ramachandran, Ph.D. , D.V.M.**

**2003 - 2005**

- Neuroendocrinology and transgenic study of ghrelin and GHS-R using molecular techniques including real time quantitative PCR, in situ hybridization, and Western blot. Assisted with studies focusing on adiponectin, leptin, estrogen, progesterone, and their respective receptors.
- Assisted with lentiviral culture growth, harvesting, and transfection experiments.
- Discovered calcitonin is produced in the chicken pituitary using immunohistochemistry and in situ hybridization methodologies.

The Pennsylvania State University, University Park, PA

**Graduate Research and Teaching Assistant, Dept. of Dairy & Animal Sciences**

**In Lab of Dr. Nancy Diehl, M.S. , V.M.D.**

**2002 - 2004**

- Performed research in equine feeding behavior, equine reproductive behavior, and foal imprinting and behavior.
- Assisted with teaching animal nutrition and equine courses (listed under Teaching Experience).

The Pennsylvania State University, University Park, PA

**Staff Assistant V, Dept. of Communication Arts & Sciences**

**2000 - 2002**

- Undergraduate programs staff assistant (two majors, five minors), while pursuing undergraduate studies part-time. Liaison between department and College of the Liberal Arts Advising Center.
- Provided preliminary advising for Communication Arts & Sciences students and prospective students, assisted with FTCAP. Provided advisor training to faculty new to advising, and support to faculty advisors in the Department of Communication Arts & Sciences and the Department of Philosophy.

The Pennsylvania State University, University Park, PA

**Additional Research Project Participation During Pursuit of Advanced Degrees**

- Role of Growth Hormone in the Hippocampus, Hypothalamus, and Pituitary During Acute Caloric Restriction in a Heterogeneous Stock Mouse Model with **Dr. Wesley Hymers**, Emeritus Professor of Biochemistry and Molecular Biology and former Director of Penn State University Center for Cell Research
- Physiological Kinetics and Mathematic Modeling of Vitamin A Metabolism using WinSAAM, **Dr. Michael Green**, Professor of Nutrition and Physiology, and former head of Department of Nutritional Sciences
- Transition Dairy Cow Nutrition, **Dr. Gabriella Varga**, Distinguished Professor of Animal Sciences

Phillip R. Hunts, M.S., V.M.D., Equine Practitioner, Littlestown, PA

**Equine Veterinary Office Manager**

**1999 – 2000**

- Maintained all Accounts Receivable, Accounts Payable, and Payroll. Pursued distance education classes at Penn State part-time.
- Acted as laboratory technician and surgical assistant as necessary. Wide variety of clients from single horse to several hundred horse operations.

Hanover Shoe Farms, Inc., Hanover, PA

**Equine Veterinary Assistant Internship, Dr. Peter Boyce, Supervisor** 1999

- Intern at world's largest Standardbred horse breeding farm.
- Assisted veterinarians with daily health evaluations, preventative care, and emergency treatment of mares, foals and stallions. Prepared mares and stallions for breeding via artificial insemination.

The Pennsylvania State University, University Park, PA

**Student Employee, Penn State Horse Barns, Mr. Ward Studebaker, Supervisor** 1997 – 1999

- Enrolled in classes full time while working part time at University owned and operated facilities.
- Provided daily care to stallions, mares, and young stock, assisted with preventative medicine and foaling.

#### SELECTED PEER REVIEWED PUBLICATIONS

**Motch Perrine, S.M.**, Cole III, T.M., Aldridge, K.A., Martinez-Abadias, N., Jabs, E.W., Richtsmeier, J.T. 2013. Craniofacial divergence by distinct prenatal growth patterns in *Fgfr2* mutant mice. *BMC Developmental Biology*. 14(1):8.

Lorenzini, A., Salmon, A.B., Lerner, C., Torres, C., Ikeno, Y., **Motch, S.**, McCarter, R., Sell, C. Mice producing reduced levels of insulin-like growth factor type 1 display an increase in maximum, but not mean, life span. *J Gerontol A Biol Sci Med Sci*. Published online July 20, 2013.

Martinez-Abadias, N.\*, **Motch, S.M.\***, Pankratz, T.L., Wang, Y., Aldridge, K., Jabs, E.W., Richtsmeier, J.T.\* 2013 Tissue-specific responses to aberrant FGF signaling in complex head phenotypes. *Dev Dyn*. 242(1):80-94. \*Indicates equal author contribution.

Martinez-Abadias, N.\*, **Motch, S.M.\***, Pankratz, T.L., Wang, Y., Aldridge, K., Jabs, E.W., Richtsmeier, J.T.\* 2013 Tissue-specific responses to aberrant FGF signaling in complex head phenotypes. *Dev Dyn*. 242(1):80-94. COVER PHOTOGRAPH. 242(3):C1. PMID: 23427066. \*Indicates equal author contribution.

Hill, C.A., Martinez-Abadias, N., **Motch, S.M.**, Austin, J.R., Wang, Y., Jabs, E.W., Richtsmeier, J.R., Aldridge, K. 2013. Postnatal brain and skull growth in an Apert syndrome mouse model. *Amer J Med Genet Part A*. 161(4):745

**Motch, S.M.** "Midi mouse as a novel model for investigating stress response during aging". Ph.D. dissertation, The Pennsylvania State University, 2010.

**Motch, S.M.** and McCarter, R.J.M. 2010. Role of oxidative damage, exercise and caloric restriction in healthspan. In *Annual Review of Gerontology and Geriatrics* (Vol. 30). Focus on Biobehavioral Perspectives on Health in Late Life. Ed. K. E. Whitfield. Springer Publishing Co. NY, NY.

**Motch, S.M.**, Harpster, H.W., Ralston, S.L., Ostiguy, N.O., Diehl, N.K. 2007. A note on yearling horse ingestive and agonistic behaviours in three concentrate feeding systems. *Appl. Anim. Beh. Sci*. 106(1-3):167-172.

Maddineni, S., Krzysik-Walker, S., Ocon-Grove, O., **Motch, S.**, Hendricks III, G., Ramachandran, R. 2007. Calcitonin is expressed in the chicken pituitary gland: Influence of gonadal steroids and sexual maturation. *Cell Tissue Res*. 327(3):521-8.

#### SELECTED PROCEEDINGS PAPER AND POSTERS

**Motch Perrine, S.M.**, Pankratz, T.L., Jabs, E.W., Richtsmeier, J.T. 2013. *Effects of FGF-FGFR signaling on mandibular variation in four craniosynostosis models*. Society of Craniofacial Genetics and Developmental Biology Annual Meeting, Boston Children's Hospital, Harvard Medical School, Boston, MA.

Richtsmeier, J.T., Aldridge, K., **Motch, S.M.**, Percival C., Martínez-Abadías N., Heuzé Y., Hill C., Wang Y., Holmes G., Jabs E.W. 2013. *Craniofacial phenotypes in the FGFR-related craniosynostosis syndromes*. 12th International Congress on Cleft Lip/Palate and Related Craniofacial Anomalies, Orlando, FL.

Richtsmeier J., Martínez-Abadías N., Heuzé Y., Percival C., **Motch S.**, Hill C., Ryan T., Wang Y., Aldridge K., Jabs E., *Making a head: diverse craniofacial outcomes in disease*. 2012 Experimental Biology meeting abstracts, Abstract #337.1 Montreal, Canada.

**Motch S.M.**, Martínez-Abadías N., Pankratz T., Percival C.J., Jabs E.W., Richtsmeier J.T. 2012. *Development of the skull in Fgfr2+/P253R and Fgfr2+/S252W mouse models for Apert syndrome in late embryogenesis*. Society of Craniofacial Genetics and Developmental Biology Annual Meeting. San Francisco, California.

Richtsmeier J., Martínez-Abadías N., Heuzé Y., Percival C., **Motch S.**, Wang Y., Jabs E., Aldridge K., Ryan T. 2012. *Why the long face? Disease phenotypes as a window of evolutionary change*. American Association of Physical Anthropologists, Annual Meeting 81.

Aldridge, K., Austin, J.R., Smallmon, E.N., Desai, R.J. Howell, L.G., Brandon, M., Wang, Y., Jabs, E.W., **Motch, S.M.**, Richtsmeier, J.T. 2012 *Brain phenotypes in the FGFR2 C342Y mouse model for syndromic craniosynostosis*. American Association of Physical Anthropologists, Annual Meeting 81.

Gant, C.A., Austin, J.R., **Motch, S.M.**, Richtsmeier, J.T., Wang, Y., Jabs, E.W., Aldridge, K. 2012 *Brain phenotypes in a mouse model for Muenke craniosynostosis syndrome*. 11<sup>th</sup> Annual Biomedical Research Conference for Minority Students, Washington University in St. Louis, MO.

Gant, C.A., Austin, J.R., **Motch, S.M.**, Richtsmeier, J.T., Wang, Y., Jabs, E.W., Aldridge, K. 2012 *Brain phenotypes in a mouse model for Muenke craniosynostosis syndrome*. American Association of Physical Anthropologists, Annual Meeting 81.

**Motch, S.M.**, Neuberger, T., Martinez-Abadias, N., Pankratz, T.L., Wang, Y., Aldridge, K., Jabs, E.W., Ryan, T.M., Richtsmeier. 2012. *Quantitative examination of negative spaces in a Crouzon/Pfeiffer mouse model at birth using multimodal imaging*. International Society for Magnetic Resonance in Medicine (ISMRM). Melbourne, Victoria, Australia.

**Motch, S.M.**, Martinez-Abadias, N., Pankratz, T.L., Wang, Y., Aldridge, K., Jabs, E.W., Neuberger, T., Ryan, T.M., Richtsmeier, J.T. 2011. *Reading between the lines: the development of negative spaces in a Crouzon/Pfeiffer syndrome mouse model at birth*. Society of Craniofacial Genetics and Developmental Biology Annual Meeting.

**Motch, S.**, Graboski, R., Sell, C., Stout, J., McCarter, R. 2010. Effects of lifelong decreased IGF-1 on physiological status in mice. Experimental Biology, abstract # 2094, Anaheim, CA, USA.

Ramachandran, R., Maddineni, S., Hendricks III, G., **Kress (Motch), S.** 2005. Fasting increases ghrelin precursor protein gene expression in the chicken pituitary gland. 35<sup>th</sup> Annual Meeting of Society for Neuroscience, USA. Poster presented by Dr. Ramachandran.

**Kress (Motch), S.**, Diehl, N., Harpster, H., Varga, G., Ralston, S. 2004. Yearling horse ingestive behavior and social interaction in three concentrate feeding systems. Proc. Of the 38th Intl Congress of the ISAE. Pg. 79. Presented 30 minute oral presentation at conference, Helsinki, Finland.

#### RADIO INTERVIEWS AND PRESS RELEASES

Penn State News Press Release: “3-D Imaging sheds light on Apert syndrome development” on February 28, 2014 regarding article:

**Motch Perrine, S.M., Cole III, T.M., Aldridge, K.A., Martinez-Abadias, N., Jabs, E.W., Richtsmeier, J.T.** 2013. Craniofacial divergence by distinct prenatal growth patterns in Fgfr2 mutant mice. BMC Developmental Biology. 14(1):8.

<http://news.psu.edu/story/306052/2014/02/28/research/3-d-imaging-sheds-light-apert-syndrome-development>

BioMed Central Press Release: “Joan Richtsmeier on 3D cranial changes in mouse models of Apert syndrome” on March 3, 2014 regarding article:

**Motch Perrine, S.M., Cole III, T.M., Aldridge, K.A., Martinez-Abadias, N., Jabs, E.W., Richtsmeier, J.T.** 2013. Craniofacial divergence by distinct prenatal growth patterns in Fgfr2 mutant mice. BMC Developmental Biology. 14(1):8.

<http://www.biomedcentral.com/biome/joan-richtsmeier-on-3d-cranial-changes-in-mouse-models-of-apert-syndrome/>

Penn State Radio “ComRadio News” broadcasts at 5 pm and 6pm on March 5, 2014 regarding the article: **Motch Perrine, S.M., Cole III, T.M., Aldridge, K.A., Martinez-Abadias, N., Jabs, E.W., Richtsmeier, J.T.** 2013. Craniofacial divergence by distinct prenatal growth patterns in Fgfr2 mutant mice. BMC Developmental Biology. 14(1):8. Interviewed by Kristen Garrone.

#### AWARDS

Editor's Pick, <i>BMC Developmental Biology</i> 2014, 14:8.	2014
Intercollege Graduate Degree Program in Physiology Travel Award, Penn State University	2010
Huck Institute Scholarship, Penn State University	2010
Graduate Teaching Assistantship, Penn State University	2009 – 2010
University Graduate Fellowship, Penn State University	2004 – 2005
Graduate Research and Teaching Assistantship, Penn State University	2002-2004
The Graduate School Teaching Certificate, Penn State University	2003
High Point Individual, Advanced/Returning Student Category,	2003
Animal Behavior and Welfare Competition, Michigan State University	
Dolphin Scholarship Foundation Scholarship, Virginia Beach, VA	2001
Anna K. Eaton Women in Agriculture Scholarship, Penn State University	1997-1999
Dolphin Scholarship Foundation Scholarship, Virginia Beach, VA	1996-1999
Departmental Scholarship, Dept. of Dairy & Animal Sciences, Penn State University	1997
Fleet Reserve Association Scholarship, Alexandria, VA	1996
Howard Hughes Institute Scholarship, Summer Biology Coursework and Research, Eberly College of Science, Penn State University	1996
Mason Electric Association Scholarship, Pennsylvania Rural Electric Association	1996

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

The American Physiological Society (APS)  
 The Human Anatomy and Physiological Society (HAPS)  
 Society of Craniofacial Genetics and Developmental Biology (SCGDB)

#### SERVICE TO THE PROFESSION

- I have acted as reviewer for the following peer reviewed journals
  - The Journals of Gerontology, Series A: Biological Sciences
  - American Journal of Physical Anthropology

EXTRACURRICULAR ACTIVITIES

The Pennsylvania State University, University Park, PA

**Judicial Affairs Advisor, August 2007 – present**

- Act as advisor to undergraduate and graduate students involved in disciplinary proceedings. Provide confidential advice sessions, support and accompany to disciplinary meetings and Code of Conduct hearings.

Frenchville, PA

**Co-owner, Bear Hill Horse Logging, 2012 – present**

- Act as bull of the woods and outreach coordinator by developing educational and presenting information on horse logging and restorative forestry to the public with a primary focus on a yearly Pennsylvania Farm Show education booth and demonstrations.