TEXAS A&M UNIVERSITY

IFRB 2023

Interdisciplinary Faculty of Reproductive Biology

Confronting and solving challenges to reproduction and health by conducting basic, clinical and translational research, and shaping science and health policy

2023, ISSUE 1

POINTS OF INTEREST:

- **The IFRB was organized in 1992 and is one of the largest Reproductive Biology Programs in the US**
- **Membership includes 39 faculty from 9 departments, 4 colleges and 2 system components**
- **IFRB sponsored activities: 28th Annual R.O. Berry Lecture, 33 year old IFRB Repro Forum Seminar Series, 28th Texas Forum on Reproductive Sciences, and 16th Annual IFRB Retreat**

INSIDE THIS ISSUE:

New IFRB Faculty Spotlight

***Dr. Camilo Hernández-Avilés** is a new Assistant Professor of Equine Theriogenology in the Department of Large Animal Clinical Sciences, School of Veterinary Medicine and Biomedical Sciences at Texas A&M University. Dr. Hernandez was born and raised in Bogota DC, Colombia (South America). He received his Doctor of Veterinary Medicine degree at the Universidad Nacional de Colombia (National University of Colombia) in 2018.

While in veterinary school, Dr. Hernandez was an Undergraduate Research Assistant at the Reproductive Biotechnology Laboratory, Universidad Nacional de Colombia, where he designed and conducted various research projects focused on the validation of fluorescence-based techniques for sperm quality analysis in stallions, bulls, dogs, and boars. Also, he conducted two studies focused on the standardization of sperm cryopreservation protocols for Colombian Paso Fino stallions and working dogs. From 2017 to 2018, he was a Visiting Scholar at the Stallion Reproduction Studies Laboratory at Texas A&M University. During this time, he conducted various studies focused on the effect of semen extender components (i.e., antibiotics, energy substrates) on the quality of cool-stored stallion sperm, as well as the validation of flow cytometric-based assays for the analysis of oxidative stress in stallion semen.

After graduation from veterinary school, he and his wife (an equine veterinarian) started an ambulatory practice focused on reproductive services for Paso Fino stud farms in their native Colombia. Dr. Hernandez's PhD in Biomedical Sciences at Texas A&M University (2019-2022) focused on clinical and molecular studies on acrosome dysfunction in stallion sperm. His studies included the clinical characterization of acrosome dysfunction in Thoroughbred (TB) stallions, the validation of two flow cytometry-based assays for acrosome function in stallion sperm, and the application of mass spectrometry-based technologies to identify candidate proteins associated with Impaired Acrosomal Exocytosis (IAE) in Thoroughbred stallions. While conducting his doctoral studies, Dr. Hernandez also finished a Clinical Residency in Equine Theriogenology at Texas A&M University (2021-2023). During this time, he was the primary clinician in charge of equine reproduction cases presented to the Veterinary Medical Teaching Hospital at Texas A&M University and conducted various clinical studies focused on sperm analysis techniques and semen cryopreservation in stallions.

Currently, he is board-eligible in the American College of Theriogenologists. To date, he has authored or co-authored 50 scholarly works, including 24 peer-reviewed papers, 2 book chapters, and 24 peer-reviewed abstracts. His research works have been presented in various national and international meetings, including the Society for Theriogenology (2020-2022), the American Association of Equine Practitioners (2019), and the International Symposium on Equine Reproduction (2018, 2023).

His clinical and research interests mainly focus on stallion reproduction and assisted reproductive technologies in equids. Research highlights, current and future directions as a faculty at Texas A&M University include: Identification of proteins associated with gamete interactions in the horse: The physiological processes that govern the interactions between sperm and the oocyte in the horse are less understood than in other domestic animals. Only in 2022, was a repeatable model for conventional in vitro fertilization in the horse reported. Part of Dr. Hernandez's research focuses on the implementation of flow cytometric-based assays and molecular biology techniques (i.e., mass spectrometry, immunofluorescence) to identify and characterize proteins that are related to stallion sperm capacitation, acrosomal exocytosis (AE), and sperm-oocyte interaction processes. During his doctoral studies, he validated a model to induce spontaneous AE in viable stallion sperm that also results in an increase in protein tyrosine phosphorylation associated with the sperm acrosome and midpiece (***see Figure 1, page 2***). Such immunofluorescence patterns reach their maximum levels at 4 and 6 hours of in vitro incubation, coincide with the maximum levels of spontaneous AE in viable stallion sperm, and are similar to those recently reported in the horse IVF model.

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IFRB New Faculty Spotlight: (cont'd from page 1)

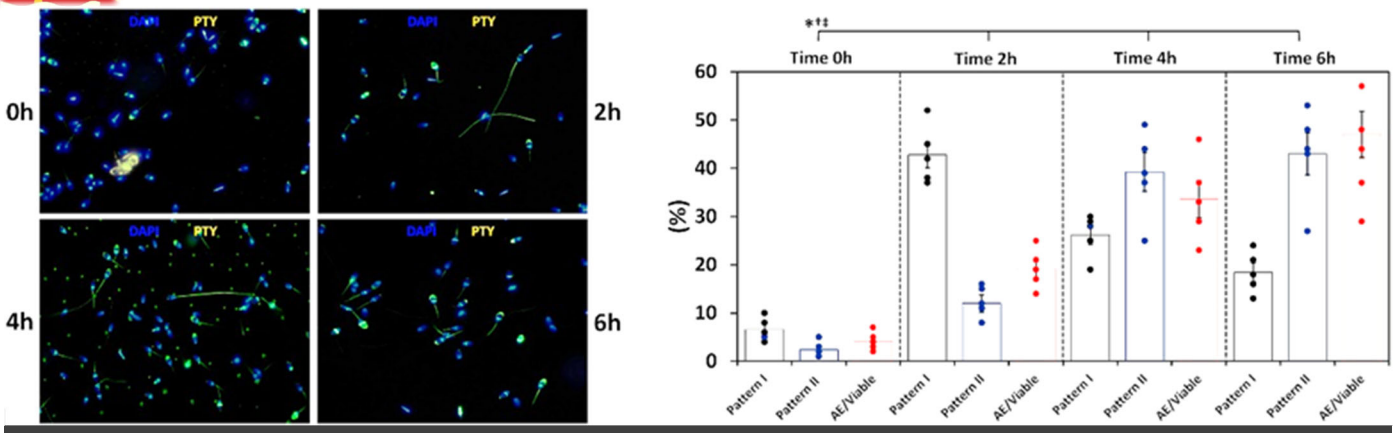

Figure 1. The occurrence of protein tyrosine phosphorylation (Anti-PTY Alexa 488 antibody), and spontaneous AE in viable sperm (AE/Viable), as determined by flow cytometry, in stallion sperm incubated under in vitro conditions for up to 6 hours. Two different PTY immunofluorescence patterns were identified (Pattern I: Immunofluorescence predominantly at the sperm principal piece; Pattern II: Immunofluorescence predominantly at the sperm acrosome and midpiece). The occurrence of Pattern II (reported as indicative of sperm capacitation) increased over time and was associated with the highest levels of AE/Viable sperm (from Hernandez-Aviles et al., Theriogenology 2023; 210: 169 – 181).

Currently, he is combining this spontaneous AE model with mass spectrometry-based techniques to characterize post-translational changes in sperm proteins (serine/threonine phosphorylation) and determine which of these proteins could be validated as a biomarker of sperm quality and fertility potential in stallions.

Understanding the causes and pathophysiology of IAE in Thoroughbred (TB) stallions: A group of TB stallions (1 – 4% of the population) are highly subfertile despite normal sperm quality and breeding management. Previous works led by Dickson D. Varner at Texas A&M University indicated that sperm from these stallions failed to undergo AE after being incubated with the calcium ionophore A23187. More recent studies led by Terje Raudsepp at Texas A&M University revealed that these stallions were double homozygous (A/A-A/A) for two SNPs in exon 5 of the FKBP6 gene. While genomic analyses for this gene are accurate in detecting stallions that are subfertile due to IAE, the relationship between the FKBP6 protein and acrosome function in sperm is difficult to establish. During his doctoral dissertation, Dr. Hernandez employed data-independent acquisition mass spectrometry (DIA-MS) to identify candidate proteins associated with IAE in TB stallions. His studies demonstrated that a group of proteins of differential abundance between sperm from fertile and subfertile (FKBP6- "positive") TB stallions were related to metabolism, while other proteins were related to lipid metabolism. A group of 7 of these proteins (***Figure 2***) displayed differential abundance levels not only between stallion groups, but also while sperm from fertile TB stallions

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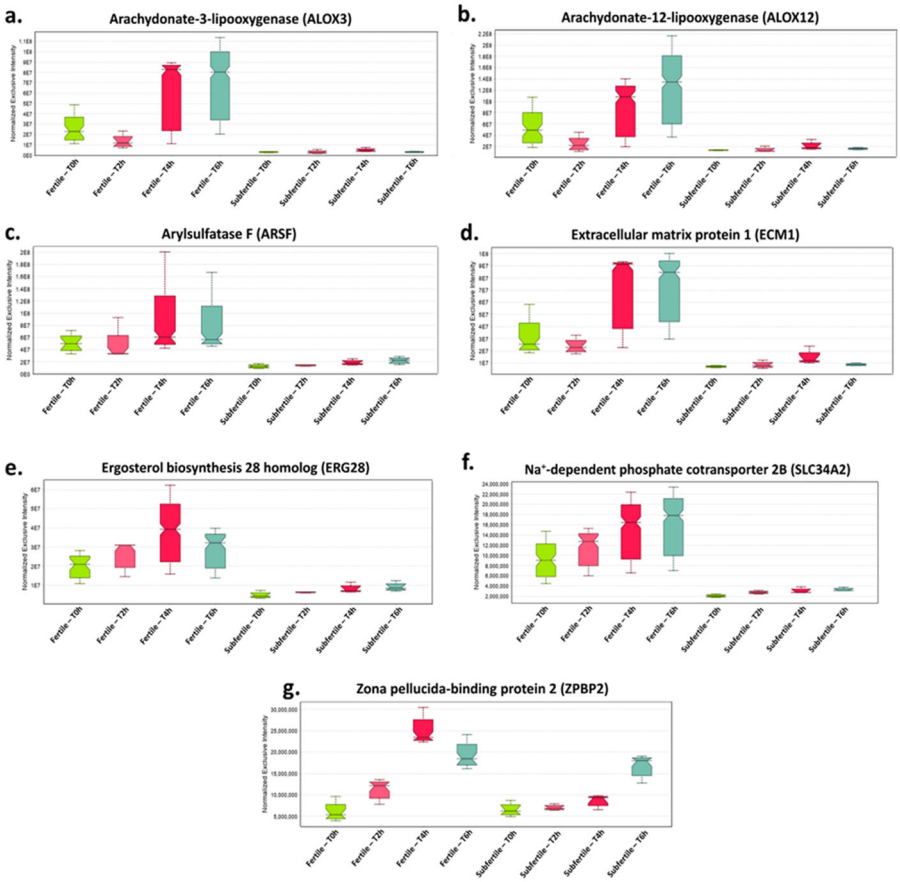


Figure 2. Boxplots representing the median relative abundance of seven proteins of differential abundance in sperm from fertile and subfertile (FKBP6- "positive") TB stallions, as detected by DIA-MS. These proteins were studied in sperm from these stallion groups after incubation under in vitro conditions to stimulate spontaneous AE in viable sperm (manuscript under review).

IFRB Seminar Series, 2023

The IFRB Seminar Series, Reproductive Biology Forum, has been held during the Fall and Spring Semesters since1990. The IFRB Seminar series is currently coordinated by **Dr. Sakhila Banu.**

Spring 2023

January 20, **Barbara Vanderheyden, Ph.D.,** Corinne Boyer Chair in Ovarian Cancer Research, Professor, Dept. of Cellular and Molecular Medicine, University of Ottawa, Senior Scientist, Cancer Therapeutics Program, Ottawa Hospital Research Institute.

"Ovarian Aging and Ovarian Cancer Risk."

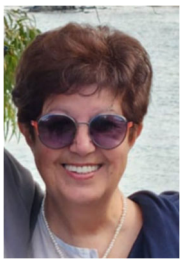
January 27, **Chung Peng, Ph.D.,** Professor, Department of Biology and York Research Chair in Women's Reproductive Health, York University, Toronto, Ontario. ***"MicroRNAs and Their Modulated Signaling Networks in Placental Development and Preeclampsia."***

February 3, **Joy Pate, Ph.D.,** C. Lee Rumberger and Family Chair in Agricultural Sciences, Professor of Reproductive Physiology, Department of Animal Sciences, Penn State University. University Park, PA. ***"New Perspectives on an Old Problem: The Fate of the CL During Early Pregnancy in the Cow."***

February 10, **John Aplin, Ph.D.,** Professor, Division of Developmental Biology & Medicine (L5), Honorary Professor, FBMH Faculty Office Administration (L5), The University of Manchester, Manchester, UK. ***"Endometrial Receptivity, Implantation and Trophoblast Differentiation: Some Recent Findings In Vitro and In Silico."***

February 17, **Hakhyun Ka, Ph.D.,** Professor and Division Chair, Division of Biological Science & Technology, Yonsei University, Republic of South Korea. ***"Maternal Immune Response to Conceptus Signals During Early Pregnancy in Pigs."***

February 24, **Rina Meidan, Ph.D.,** Professor (Emerita) of Reproductive Endocrinology, The Hebrew University of Jerusalem, Rehovot, Israel. ***"A Tale of Two Endothelins: The Rise and Fall of the Corpus Luteum."***



March 3, **Constantine Simintiras. PhD.,** Assistant Professor of Reproductive and Developmental Biology, School of Animal Sciences, Louisiana State University, Baton Rouge, LA , ***"Modelling Endometrial Gland Formation and Behavior In Vitro."***

March 30, **Greg Fitzharris, Ph.D.,** Professor and Directeur, Département de Pathologie et Biologie Cellulaire, Université de Montréal, Chercheur, Centre de Recherche du CHUM Montreal. ***"Healthy Cell Divisions as the Basis for a Healthy Conception."***

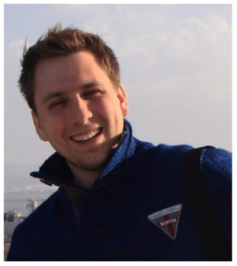
April 28, **Susanne E. Ulbrich, Ph.D.,** Professor of Animal Physiology, Department of Environmental Systems Science, Institute of Agricultural Sciences University of Zurich-ETH Zurich, Switzerland. ***"Pregnancy in Waiting – Deciphering Embryonic Diapause in Roe Deer to Understand Embryo-Maternal Communication"***

Fall 2023

September 2, **Irshad Ahmad Hajam, Ph.D.,** Comparative Endocrinology Laboratory, Department of Physiology and Pharmacology, TAMU. ***"Fabrication and Characterization of Polymer-Based Nanoparticles for Precision Androgen Delivery to Mitochondria"***

Nirvana Sangeeta Mahabir, DVM, Department of Veterinary Physiology and Pharmacology. ***"Development of a Novel Porcine Transmasculine Model for the Study of Cardiometabolic Health."***

September 8, **Piotr Kaczynski, Ph.D.,** Assistant Professor, Department of Hormonal Action Mechanisms, Polish Academy of Sciences, Olsztyn, Poland. ***"Early Pregnancy in Pigs Estradiol."***



September 15, **Lacey Luense, Ph.D**., Assistant Professor, Department of Animal Science, Texas A&M University, "***An Abnormal Histone Signature in Sperm Leads to Altered Preimplantation Embryo Development."***

September 22, **Joe Arosh, Ph.D.,** Professor, Department of Veterinary Integrative Biosciences, Texas A&M University. ***"Corpus Luteum Survival During Establishment of Pregnancy in Ruminants: A Molecular and Cellular Revisitation."***

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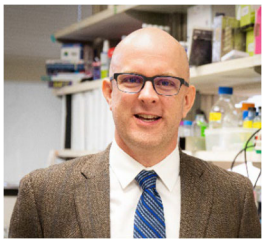
IFRB Seminar Series, 2023 continued from page 3

*September 29, **Greg Johnson, Ph.D.,** Professor, Department of Veterinary Integrative Biosciences, Texas A&M University. ***"Understanding Placentation in Pigs and Ruminants."***

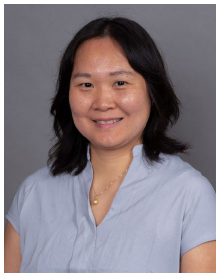
*October 6, **Ashish Tyagi, Ph.D.**, Research Assistant Professor, School of Pharmacy, Texas A&M University, ***"Targeting FOXM1: a Promising Therapeutic Strategy for Chemo-Resistant Colorectal Cancer Treatment."***

*October 13, **Xiaoqiu "Churchill" Wang, Ph.D.,** Assistant Professor, Department of Animal Science, North Carolina State University, Raleigh, NC, ***"Navigating Reproductive Aging: Unveiling Endometrial Function and Adaptability During Pregnancy."***

*October 20, **Patrick Lonergan** Ph.D., D.Sc., MRIA, Professor of Animal Reproduction, School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Member, Royal Irish Academy Ireland. ***"Conceptualizing the endometrium - maternal-embryonic communication leading to pregnancy establishment in cattle."***



*October 27, **Michael Golding, Ph.D.,** Professor, Department of Physiology and Pharmacology, Texas A&M University. ***"Epigenetic Programming of Sperm, Altered Placentation, and the Development of Alcohol-Related Birth Defects."***



November 17, **Lingling Xei, Ph.D.,** Associate Professor, Department of Nutrition, College of Agriculture and Life Sciences, Texas A&M University. ***"Trophoblast Differentiation vs. Migration: Understanding Gene × Environment in Hypertensive Pregnancy Disorders."***

December 1, **Geetu Tuteja, Ph.D.,** Gregory L. and Kathleen C. Geoffroy Faculty Fellow, Associate Professor, Departments of Genetics, Development and Cell Biology, Iowa State University. ***"Using -Omics Based Approaches to Identify Key Regulators of Placental Development,"***

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The first speaker of IFRB Seminar Series in 2024 will be Dr. Janko Gospocic, the Southwestern Medical Foundation Scholar in Biomedical Research from the University of Texas Southwestern Medical Center and will be hosted by Dr. Lacey Luense.

IFRB New Faculty Spotlight: (cont'd from page 2)

underwent AE, suggesting the relative abundance of these proteins was changed upon completion of AE. Interestingly, previous works by Texas A&M workers indicated that the cholesterol-to-phospholipid ratio in sperm membrane extracts and seminal plasma was 1.9 times higher in sperm from subfertile than fertile TB stallions, establishing a potential link between the reduced ability of sperm from these stallions to undergo AE and lower abundance of proteins associated to lipid metabolism in their sperm. **F**urthermore, in his studies, he demonstrated that one of these proteins, arylsulfatase F (ARSF), was expressed in sperm from fertile TB stallions at the acrosome, midpiece, and principal piece, while only at the midpiece and principal piece in sperm from subfertile (FKBP6- "positive") TB stallions (**Figure 3**). His current works are focused on the validation of ARSF as a biomarker of sperm quality in TB stallions, by determining its dynamic localization within the sperm during sperm capacitation and AE, and its potential use as a flow cytometry-based assay for fertility potential in TB stallions.

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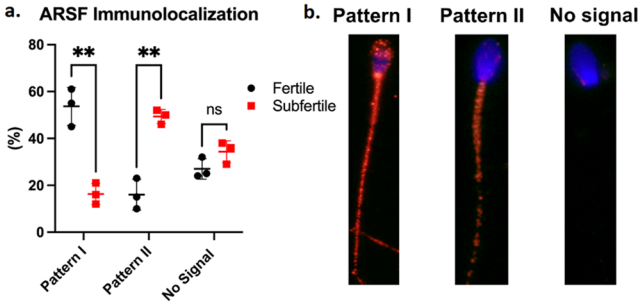


Figure 3. The localization of arylsulfatase F (ARSF) in sperm from fertile and subfertile (FKBP- "positive") TB stallions, as determined by immunofluorescence. The mean percentages of sperm displaying each immunofluorescence pattern, by stallion group, are presented (manuscript under review).

TEXAS A&M UNIVERSITY

IFRB Trainee News

Frontiers in Reproduction Course: Molecular and Cellular Concepts and Applications

http://www.mbl.edu/fir/
Course Date: Apr 28, 2024 - Jun 9, 2024

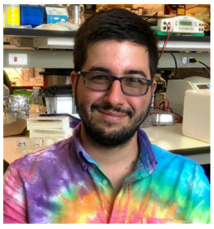
Submission Deadline: January 8, 2024

Course Director: Rafael Fissore, University of Massachusetts, Amherst. Section Directors: Djurdjica Cross, Karen Schindler, Peggy Petroff

RECENT GRADUATES

***Hadil Al Muhisen,** completed her Toxicology **Ph.D.** degree in the laboratory of **Dr. Tracy Clement** in May, 2023. Her dissertation title was Characterization of Testis Specific ACTRT2 and ACTRT3 in Mammalian Spermatogenesis and Toxicological Profile of Remdesivir in Male Fertility Outcomes Using Animal Models."

***Alexis Roach,** completed her Biomedical Sciences **Ph.D.** degree in the laboratory of **Dr.** Michael **Golding** in June 2023. Her dissertation was entitled "Paternal Alcohol Exposures, the Microbiome- Metabolome Axis, Oxidative Stress, and their Impacts on IVF Outcomes."

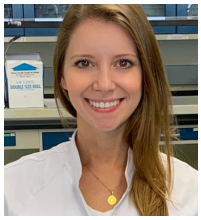


***Pierre Ferrer,** completed his Toxicology **Ph.D.** degree in the laboratory of **Dr. Tracy Clement** in October, 2023. The title of his dissertation was "Molecular Insights into Spermiogenesis: How Actin-like Proteins 7A & &B Regulate Gene Expression and Intracellular Structures."

***Kara Thomas**, completed her Biomedical Sciences **Ph.D.** degree in the laboratory of **Dr. Michael Golding** in June 2023. Her dissertation was entitled "Deciphering variation in Fetal Alcohol Spectrum Disorders, the missing piece: Dad."

***Audrey Earnhardt,** completed her Physiology of Reproduction Ph.D. degree in the laboratories **of Dr. Thomas Welsh, Jr.,** and **Ron Randel** in May, 2023. Her dissertation title was "Effect of Prenatal Transportation Stress on Methylome and Transcriptome of Specific Components of the Bovine Hypothalamic-Pituitary-Adrenal Axis." Audrey was the recipient of a 2023 Distinguished Graduate Student Award from TAMU Association of Former Students.

***Ramiro Oliveira** completed his **Ph.D.** degree in August, 2023, in the laboratory of **Dr. Ky Pohler**. The title of his dissertation was "Reproductive Strategies for Increasing Fertility in Beef Cattle"



***Gabriela Dalmaso** completed her Ph.D. degree in **Dr. Ky Pohler's** laboratory December, 2023. The title of her dissertation was "Pregnancy Associated Glycoproteins as Insights Into Late Embryonic Development and Mortality in Beef Cattle."

***Kaitlin Epperson** completed a Physiology of Reproduction Ph.D. Degree in May 2023 with **Dr. George Perry.** Her dissertation title was "Modulation of Ovarian Physiology Elicited by Immune System Response to Pre-Breeding Vaccination in Beef Cattle.

***Alyx Staples** completer her M.S. degree in **Dr. Ky Pohler's** laboratory in May, 2023. The title of her thesis was "Pregnancy Loss in Embryo Transfer Using Different Stages, Grades and Types of Embryos."

***Sarah Singleton,** completed her Physiology of Reproduction **M.S.** degree in the lab of **Dr. Ky G. Pohler** in June, 2023. The title of her thesis was "Conceptus-Maternal Interactions in Parthenogenetic Cattle Pregnancies."

***Brooke McAnally** completed her Physiology of Reproduction **M.S. degree** with **Dr. Rebecca Poole** in December, 2023. Her thesis title was, "Boar reproductive microbiomes in relation to sperm quality and toll-like receptor expression." She is pursuing a Ph.D. at the University of Nebraska-Lincoln with Dr. Amy Desaulniers. Brooke presented her research at several meetings and placed 3rd in the ASAS Southern Section 3 Minute Thesis Competition 3rd in the ASAS Master's Student Poster Competition.

***Molly Smith** completed a Physiology of Reproduction **M.S.** degree with **Dr. Rebecca Poole** in December, 2023. Her thesis title was "Reproductive microbiomes and cytokine profiles of beef cattle in relation to fertility." She will pursue a Ph.D. with Dr. Pedro Fontes at the University of Georgia. Molly presented her research at the Texas and Southwestern Cattle Raiser Conference, Student Research Week, the Society for Advancement of Chicano and Native Americans in Science, and American Society of Animal Science. Molly placed first in the ASAS Southern Section 3 Minute Thesis Competition/Master's Division and 2nd place for a poster at SACNAS.

***Sara Gurule** earned a **M.S.** degree in Physiology of Reproduction under the mentorship of **Dr. Rodolfo Cardoso.** Her thesis research focused on the effects of prenatal androgen exposure on the reproductive neuroendocrine function in a sheep model of PCOS. Sara returned to New Mexico State University to pursue a PhD degree under the mentorship of Dr. Jennifer Hernandez Gifford. Sarah was the recipient of the Department of Animal Science 2023 Outstanding Master's Student Award. (continued on page 11)

IRFB Faculty Activities

NEW GRANTS:

***Dr. Sakhila Banu** received notification of a NIH R21 award, "Evaluating the effects of hexavalent chromium on uterine vascular remodeling." 9/1/22 - 8/3/24. $416,625.

***Dr. Heidi Vanden Brink** was the recipient of a Global Institute for Hispanic Health (GIHH) Seed Grant, "Impact of Diet and the Food Environment on Polycystic Ovary Syndrome Risk in Hispanic Adolescents." Total direct: $50,000. Co-PIs: Dr. Rosaleen Bloom, RN PhD (Nursing, Texas A&M University), Rosalie Castaneda, NP (GIHH, Driscoll Children's Hospital).

***Drs. Terje Raudsepp** (PI), Brian Davis and Rytis Juras (co-PIs), received a USDA/ AFRI award, "Exploring the Genomic Component of Equine Sex Development and Reproduction." 5/1/2023-5/31/2026, $644,320.

***Drs. Terje Raudsepp** (PI), Brian Davis and Rytis Juras (co-PIs), Received a Grayson -Jockey Club Research Foundation Award "Genomics of Thoroughbred stallion subfertility. 4/1/2023-3/31, 2025, $77,371.

***Drs. Terje Raudsepp** (PI), Brian Davis (co-PI,) from the American Quarter Horse Research Foundation. "Exploring the Genomic Component of Reproductive Health in Mares: Molecular Signatures for X-Monosomy-Like Gonadal Dysplasia." 10/1/2023—9/30/2024. $39,021.

***Drs. Terje Raudsepp** (PI), Brian Davis, Rytis Juras, James Derr, David Riley, (Co-PIs) received an AgriLife Research Equipment grant of $125,000 to purchase advanced multi-purpose genotyping platform.

***Drs. Reinaldo Cooke** (PI/PD) and **Drs. Ky Pohler and Rodolfo Cardoso** (co-PIs) received a new grant from USDA-AFRI-NIFA entitled "Unraveling The Benefits Of Omega-6 Fatty Acids To Pregnancy Establishment And Maintenance In Beef Females". 5/1/2023 – 4/30/2028, $650,000.

***Drs. Thomas Welsh,** (PI), **Noah Cohen, Angela Bordin** and **Sarah White-Springer**, (Co-PIs), received USDA Animal Health and Disease Research Capacity Funding: Immunometabolism of Healthy and Rhodococcus-infected Foals" 2024-2026, $91,000.

***Drs. Sarah White-Springer** (PI), **T. Welsh** and **D. Riley** (Co-PIs), **and M. McCue** (U. of MN; Co-PI) received USDA Animal Health and Disease Research Capacity Funding: "Determining Biomarkers of Equine Subclinical Inflammation to improve health." 2024-2026, $100,000.

***Drs. T. Welsh** (PI), **Rodolfo Cardoso, Noah Cohen, Nancy Ing, Sara Lawhon, George Perry, David Riley, and Sarah. White-Springer** (Co-Is). USDA Hatch-Multistate Program/Texas A&M AgriLife Research Equipment Funds: "Immunophysiology Research Laboratory Equipment."2023-2024, $30,000.

***T. Welsh** (PI), **C. Kerth** and **J. Leatherwood** (Co-PIs). Texas A&M AgriLife Research Institute for Equine Sciences Grant Program: "Effects of Bisphosphonate Administration on Synovial Metabolome of Juvenile Horses Challenged with Intra-articular Lipopolysaccharide." 2023-2024, $20,000.

*__T. Welsh__ (PI), __G. Perry__ (Co-PI). USDA Hatch-Multistate Program/Texas A&M AgriLife Research: "Effect of Stress on Telomere Length in Cattle" 2023, $15,000.

*__Sarah White-Springer__ (PI), __William Murphy__ and __T. Welsh__ (Co-PIs). Texas A&M AgriLife Research Institute for Equine Sciences Grant Program: "Elucidating the Circadian-Inflammation Relationship in Young Horses."2023-2024, $20,000.

***Sarah White-Springer** (PI), **T. Welsh** (Co-PI). USDA Formula Animal Health: "Promoting Welfare and Productivity in Beef Cattle Through Novel Investigations of Cellular inflammatory Environments." 2023-2024, $20,000.

***G. Carstens** (PI), **T. Welsh** (Co-PI). USDA Formula Animal Health: "Discovery of Metabolomic Profiles Associated with Bovine Respiratory Disease (BRD) in Beef Cattle" 2023-2024. $17.000.

8Dr. Yatta Boakari (PI)

***Drs. Noah Cohen** (PI), **Yatta Boakari** (Co-PI), Angela Bordin, and Michael Criscitiello received an AgriLife Equipment grant, $48,178.

***Drs. Yatta Boakari** (PI), Hossam El-Sheikh Ali (Co-PI), Barry Ball, Kirsten Scoggin, Claudia Barbosa Fernandes (Co-Is) received finding from the Department of Large Animal Clinical Sciences, "Transcriptomic analysis of equine amnion involved in ascending placentitis," 4/1/2023, $20,000.

*__Drs. Yatta Boakari__ and Claudia Fernandes received funding from the University of Sao Paulo-International entrepreneurship externship scholarship Agencia USP de Inovacao (AUSPIN), "Myometrial transcriptomic profile during gestational period of mares." 9/1/2023, $9,200.

AWARDS & HONORS:

***Dr. Guoyao Wu** was notified of the release of Research.com 2023 Edition of the Ranking of Best Scientists in the field of Animal Science and Veterinary. Dr. Wu received the #1 ranking in the world and #1 in the United States. He was also recognized with their Animal Science and Veterinary Leader award for 2023.

***Dr. Vanden Brink** received the Verity and Androgen Excess and Polycystic Ovary Syndrome Society (AEPCOS) Clinical Early Career Poster Award, which is the first ever research award given by a PCOS patient advocacy group at the annual AEPCOS Meeting.

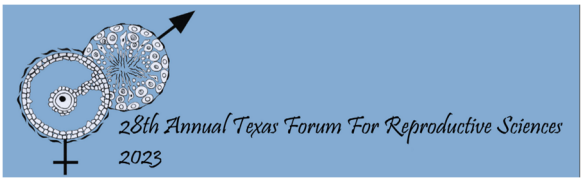
***Dr George A. Perry** was the recipient of the Animal Management Award the 2023 National American Society of Animal Science. The award recognized his highly productive program in reproductive management which is recognized in the U.S. and world wide.

INVITED TALKS:

***Dr. Heidi Vanden Brink** was an invited speaker at the Children's Mercy Research Institute Academic Seminar Series on 12/8/2023. The title of her seminar was, "Towards early detection, prevention, and management of adolescent PCOS.

***Dr. Qinglei Li** was an invited speaker at a Symposium honoring Professor & National Academy of Sciences member, Dr. Martin M. Matzuk, 4/15/2023recognizing his 30 years of reproductive research at the Baylor College of Medicine, Houston, TX. The title was "Mechanisms underlying granulosa cell tumor development." (continued, bottom page 7)

28th Texas Forum for Reproductive



***The 28th Annual Texas Forum for Reproductive Sciences regional reproductive biology meeting was hosted by Texas Children's Hospital, The Jan and Dan Duncan Neurological Research Institute, Houston, TX on April 13-14, 2023.**

TFRS was established in 1995 to encourage the exchange of scientific knowledge and collaborations among scientists in Texas in the area of female reproduction. Several years later, this cooperative group expanded to include male reproduction and began an all-inclusive Forum for Reproductive Sciences.

The Two Plenary Speakers for the 2023 meeting included:

Lacy J Barton, PhD, Department of Neuroscience, Developmental and Regenerative Biology, University of Texas at San Antonio, "Guiding the next generation: Juvenile hormones direct primordial germ cell migration to the gonad."

Francesca Cole, PhD, Department of Epigenetics and Molecular Carcinogenesis, UT MD Anderson Cancer Center. "Age-dependent alterations in chromosome structure and recombination cause aneuploidies in mouse spermatocytes."

Texas A&M trainees selected for Platform Presentations included:

***Claire Stenhouse,** Ph.D.,* Department of Animal Science, "Alkaline Phosphatase: An important regulator of ovine conceptus development."

Carli Lefevre, Department of Veterinary Integrative Bioscience, "The expression of multiple factors involved in creatine metabolism for the production of ATP is spatiotemporally regulated in elongating conceptuses and at the uterine-placental interface throughout porcine gestation."

Texas A&M IFRB members presenting posters included:

***Jacob Cabler**,* "Limited diffusion and gelatin methacrylate effects on in vitro spermatogenesis with murine testis explants."

Joe Cain, SPARC expression in murine fetuses, decidua, and placenta: correlations with SPP1 expression."

***Pierre* Ferrer**, "An indispensable protein for male fertility: Testis -specific actin-like 7A (ACTL7A) is a key cytoskeletal regulator of subacrosomal F-actins, perforatorium formation, and acrosome biogenesis.

Airanna N. Lopez, "Alternative cell signaling pathways regulated by progesterone and/or interferon tau in the ovine uterus."

***Sarai Milliron**, DVM*, "Effects of filgotinib, a selective jak-1 inhibitor, on murine spermatogenesis."

Robyn M. Moses, Characterization of lactate, lactate transporters and lactate receptors in fetal fluids, uteri and placentomes of sheep."

Mackenzie G. Newton, "Effect of day of gestation on expression of enzymes for the synthesis of polyamines by uteri of beef cattle."

Xin Fang, "Sustained activation of transforming growth factor beta receptor 1 in Sertoli cells leads to testicular granulosa cell tumor development."

Nirvay Sah, DVM, Ph.D., "Day of gestation and fetal sex influence the expression of factors involved in creatine metabolism at the uterine-placental interface in pigs."

Coauthors listed on the above presentations sessions included: Tracy Clement, David Erikson, Heewon Seo, Fuller Bazer, Robert Burghardt, Greg Johnson, Ky Pohler, Guoyao Wu,, Srijana Upadhyay, M. Ikawa, Claire Stenhouse, Katherine Halloran, Robyn Moses, Nirvay Sah, Emily Hoskins, Mackenzie Newton, Gabriela de Melo, Maddison Olivarez, Nan Ni.

Save The Date:
29th Annual Texas Forum for Reproductive Sciences
April 18-19, 2024
Location: T. Boone Pickens Medical Education & Conference Center (NG3.112)
6001 Forest Park Road, Dallas, TX 75235

Plenary Speakers:

Paula Cohen, Ph.D., Director, Center for Reproductive Genomics, Cornell University, Ithaca, NY.

Pablo Ross, DVM, Ph.D., Chief Scientific Officer, STgenetics, Navasota, TX.

Douglas Strand, Ph.D., Associate Professor, Department of Urology, UT Southwestern Medical Center, Dallas, TX

Carmen Williams, M.D., Ph.D., Deputy Chief, Reproductive

IRFB Faculty Activities continued from page 7

INVITED TALKS:

***Dr. Ky Pohler** was an invited speaker for the Penn State Animal Science Seminar Series, February, 2023. "What is the Driver of Pregnancy Loss in Cattle?" ***Dr. Pohler** also presented invited talks at the following national meetings: -Applied Reproductive Strategies in Beef Cattle:, Wyoming, September, 2023, "Post Breeding Decisions to Minimize Pregnancy Loss." -American Embryo Transfer Meeting, Orlando, Florida, October, 2023 – "Pregnancy Loss in Cattle."

***Dr. Lacy Luense** was an invited speaker at the University of Michigan, "Investigating the effects of abnormal sperm histone retention on preimplantation embryo development."

INTERNATIONAL ACTIVITIES & LECTURES:

***Dr. Ky Pohler** was invited to give the following international presentations: - International Embryo Technology Society, Lima, Peru, January, 2023: "Pregnancy Loss in Cattle: Male or Female Issue?" - Novos en Focus Brazil Vet Meeting, Brazil. March, 2023: "How to Increase Fertility in Cattle; Sire Fertility and What it Means for Pregnancy Loss." -Beef Cattle Short Course, Mexico, May, 202:"Research Update on Fertility in Cattle."

Presentations at the International Symposium on Equine Reproduction ISER XIII, July 10-14, 2023 Foz do Iguaçu, Paraná, Brazil:

***Drs. Hernández-Avilés C**, Weintraub ST, **Ramírez-Agámez L, Varner DD, Love CC**. The acrosome proteins arylsulfatase F and zona pellucida-binding protein 2 are candidate markers associated with Impaired Acrosomal Exocytosis in sperm from subfertile Thoroughbred stallions. ***Ramírez-Agámez L**, Castaneda C, Grahn RA, **Hernández-Avilés C, Raudsepp T, Love CC**. A study on methods for preimplantation genetic diagnosis on equine embryos. ***Love CC, Samper JC, Hernández-Avilés C, Ramírez-Agámez L,** Cabrera C, Ross PJ. The effect of sex-sorting on stallion semen quality. ***Samper JC, Hernández-Avilés C, Ramírez-Agámez L,** Spacek SG, Ross PJ, Cabrera C, **Moreno JF, Love CC**. Fertility of conventional and sex-sorted stallion sperm using SexedULTRA™ Genesis III technology. *C Castaneda, **C Hernandez-Aviles, CC Love, DD Varner,** R Juras, BW Davis, **T Raudsepp**. Genomic studies of Thoroughbred stallion 'idiopathic' subfertility.

(continued on page 17)

A Snapshot of IFRB Research, 2023

The IFRB is recognized as one of the most productive interdisciplinary research and education programs in reproductive biology in the U.S. The following "snapshot" of publications illustrates the multiple investigator research activities of the IFRB, involving extensive participation of trainees during 2023:

Ahmad I, Gupta S, Faulkner P, Mullens D, Thomas M, Sytha SP, Ivanov I, Cai JJ, Heaps CL, Newell-Fugate AE. Single-nucleus transcriptomics of epicardial adipose tissue from females reveals exercise control of innate and adaptive immune cells. bioRxiv. 2023 Nov 5:2023.11.02.565385. doi: 10.1101/2023.11.02.565385.

Ali, H. E. S., Ball, B., Scoggin, K., & Boakari, Y. (2023). Global gene expression in equine endometrium around the time of maternal recognition of pregnancy. Journal of Equine Veterinary Science, 125, 104765.

Alonso, M. A., Boakari, Y. L., Riccio, A. V., Belli, C. B., & Fernandes, C. B. (2023). Perinatal parameters of mule and equine foals: Similarities and differences. Journal of Veterinary Behavior, 63, 31-35.

Bajwa KK, Punetha M, Kumar D, Yadav PS, Long CR, Selokar NL. Electroporation-based CRISPR gene editing in adult buffalo fibroblast cells. Anim Biotechnol. 2023 Oct 23:1-12. doi: 10.1080/10495398.2023.2271030.

Bake S, Rouzer SK, Mavuri S, Miranda RC, Mahnke AH. The interaction of genetic sex and prenatal alcohol exposure on health across the lifespan. Front Neuroendocrinol. 2023 Oct:71:101103. doi: 10.1016/j.yfrne.2023.101103.

Baker EC, San AE, Cilkiz KZ, Littlejohn BP, Cardoso RC, Ghaffari N, Long CR, Riggs PK, Randel RD, Welsh TH Jr, Riley DG. Inter-Individual Variation in DNA Methylation Patterns across Two Tissues and Leukocytes in Mature Brahman Cattle. Biology (Basel). 2023 Feb 5;12(2):252. doi: 10.3390/biology12020252.

Banerjee P, Kumaravel S, Roy S, Gaddam N, Odeh J, Bayless KJ, Glaser S, Chakraborty S. Conjugated Bile Acids Promote Lymphangiogenesis by Modulation of the Reactive Oxygen Species-p90RSK-Vascular Endothelial Growth Factor Receptor 3 Pathway. Cells. 2023 Feb 6;12(4):526. doi: 10.3390/cells12040526.

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Bayless KJ. Direct involvement of CD8+T cells in retinal angiogenesis. Arterioscler Thromb Vasc Biol. 2023 Apr;43(4):537-539. doi:10.1161/ATVBAHA.123.319101.

Bozlak E, Radovic L, Remer V, Rigler D, Allen L, Brem G, Stalder G, Castaneda C, Cothran G, Raudsepp T, , et al. Refining the evolutionary tree of the horse Y chromosome. Sci Rep . 2023 Jun 2;13(1):8954. doi: 10.1038/s41598-023-35539-0.

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Castaneda C,Hernandez-Aviles C, Love CC, Varner,DD, Juras R, Davis BW, Raudsepp T. Genomic studies of Thoroughbred stallions' 'idiopathic' subfertility. J Equine Vet Sci 125 https://doi.org/10.1016/j.jevs.2023.104581

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DeVito M, Bokkers B, van Duursen MBM, van Ede K, Feeley M, Antunes Fernandes Gáspár E, Haws L, Kennedy S, Peterson RE, Hoogenboom R, Nohara K, Petersen K, Rider C, Rose M, Safe S, Schrenk D, Wheeler MW, Wikoff DS, Zhao B, van den Berg M. The 2022 world health organization reevaluation of human and mammalian toxic equivalency factors for polychlorinated dioxins, dibenzofurans and biphenyls. Regul Toxicol Pharmacol. 2023 Nov 14:146:105525. doi: 10.1016/j.yrtph.2023.105525.

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28th Annual Dr. Raymond O. Berry Memorial Lecture

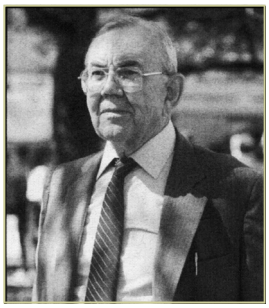
The Twenty-Eighth Annual Dr. Raymond O. Berry Memorial Lecture, sponsored and organized by the Interdisciplinary Faculty of Reproductive Biology, was held at the Texas A&M Institute for Preclinical Studies (TIPS) Auditorium in College Station. on November 3 2023.

Dr. Elizabeth A. Enninga, Assistant Professor, Department of Obstetrics and Gynecology, Mayo Clinic, Rochester, Minnesota. was selected by IRFB faculty to give the presentation, "Abnormal T-cell response during pregnancy and the promotion of chorionic villitis."

Dr. Enninga received her B.S. degree in Biotechnology and Chemistry from St. Cloud State University and her PhD from Mayo Graduate School where she focused on pathways that lead to tumor immune tolerance. During her studies, Dr. Enninga fell in love with reproductive immunology and transitioned her research career to understanding maternal-fetal immune interactions during normal and complicated pregnancies. Her lab collaborates closely with physicians from pathology, maternal-fetal medicine, radiology, and pediatrics to evaluate immune-mediated mechanisms of stillbirth, preterm birth, and fetal growth restriction with the goal of translating these findings into improved clinical care. The following statements reflect some of the extramural funding she has to support her research.

Dr. Enninga is Principal Investigator on an R21 grant from the National Institute of Allergy and Infectious Disease (NIAID) to study immune responses in the mother-infant dyad induced by fetal surgery, and associations with prematurity. She is also Co-Investigator on an R21 grant from the National Institute for Child Health and Development (NICHD) to study mechanisms by which trophoblasts recruit T cells to the placental villi during maternal HIV and CMV co-infection, and a NIAID grant to study the impact of transgenerational racial trauma on epigenetic modifications in the mother-infant dyad during pregnancy. She is the author or co-author of 49 papers in scientific journals and she has given 55 invited presentations at the national and international levels. She is also actively engaged in graduate education and teaching.

Dr. Enninga has received prestigious awards and recognitions including the: 1) Diversity Champion Award, Office of Diversity and Inclusion, Mayo Clinic; 2) Harry B. Neustein Innovation Award, Society for Pediatric Pathology; 3) Abbott Nutrition Young Investigator Basic Science Award, Perinatal Research Society; 4) Early Career Investigator Travel Award, Keystone Symposia; 5) Early Career Investigator Award, Society for Reproductive Investigation; and 6) Longo/Power New Investigator Award - Loma Linda University. Dr. Enninga is a member of the American Society of Reproductive Immunology, International Federation of Placenta Associations, Perinatal Research Society, and Society for Reproductive Investigation. She has also served as an ad hoc reviewer for several NIH study sections, and she is associate editor for the journal *Exploration of Medicine.*



For her outstanding contributions, Texas A&M University recognizes the work of Dr. Enninga through the Raymond O. Berry Memorial Lecture which was established in 1994 by **Dr. Fuller W. Bazer**. This Lecture Series ensures that his contributions will continue to inspire students and faculty whose application of biotechnology to the field of reproductive biology contributes to animal agriculture and impacts the biomedical community. Dr. Berry's pioneering studies of genetic factors affecting reproduction contributed basic knowledge about maternal immune recognition of the fetal-placental unit. These principles are now fundamental to the discipline of reproductive immunology.

"Dr. Berry's pioneering studies contributed basic knowledge about maternal immune recognition of the fetal -placental unit."
-Fuller W. Bazer

For the first 25 years of the Annual Berry Memorial Lecture, **Dr. Duane Kraemer**, who worked with Dr. Berry, led off the Lecture by providing an entertaining presentation that included memories of Dr. Berry. For the past three years **Dr. Bill Foxworth**, a doctoral trainee of Dr. Kraemer, presented Dr. Kraemer's slides along with comments on Dr. Berry's seminal contributions that launched the reproductive immunology field.

Support for the IFRB and the Twenty-Eighth Annual Dr. Raymond O. Berry Memorial Lecture was provided by the Department of Animal Science, College of Agriculture and Life Sciences; Departments of Veterinary Integrative Biosciences, Veterinary Large Animal Clinical Sciences, and Veterinary Physiology and Pharmacology, College of Veterinary Medicine and Biomedical Sciences; College of Agriculture and Human Sciences, Prairie View A&M University; and Departments of Neuroscience and Experimental Therapeutics, and Molecular and Cellular Medicine, College of Medicine, Texas A&M University.

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Below: Meeting organizers and presenters (left to right), *Drs. Rodolfo Cardoso, Greg Johnson, Fuller Bazer, members of Dr. Berry's family, Mrs. Dorothy McLemore, Dr. Berry's daughter, Dr. Joe McLemore (son-in-law) and Dr. Bill Foxworth.*

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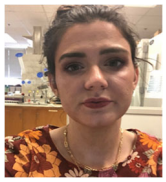
IFRB Trainee News (continued from page 5)



***Amy L. Barrett** completer a Biomedical Sciences M.S. degree working with **Drs. Sakhila Banu** and **James Cai** in December, 2023. Her research focused on transcriptomic changes in rat placenta with Cr(VI) exposure.

***James M. George** completed a M.S. in Animal Science working with **Dr. Thomas Welsh, Jr.** in August, 2023. His thesis wat titled "Bisphosphonate Effects on Markers of Cartilage Metabolism and Inflammation in Juvenile Horses Challenged with Intra-articular Lipopolysaccharide."

AWARDS AND HONORS

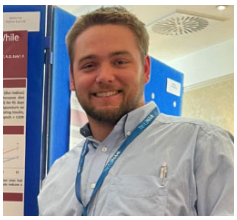
***Pierre Ferrer**, was awarded the American Society of Andrology's 2023 Lonnie D. Russell Merit Award for research on male fertility The Annual Award is given to a Society trainee for the best original laboratory or clinical research report. During the annual meeting in Boston, Pierre presented his work on the protein mechanisms essential for spermatogenesis. He found that the actin-like 7A (ACTL7A) protein regulates several factors necessary for the formation of the acrosome. Some of this research was published in April in the journal *Molecular Human Reproduction*. Pierre trained with **Dr. Tracy Clement,** whose laboratory focuses on the genetics, epigenetics, molecular and cellular biology involved in male fertility.

***Joe Cain**, doctoral student with **Dr. Greg Johnson**, was the recipient of a USDA-NIFA-AFRI Merit Award, during the 56th Annual Meeting of the Society for the Study of Reproduction in Ottawa, Canada. His research presentation was titled, "Pig conceptuses secrete extracellular vesicles containing IFNG into the uterine lumen for paracrine communication with the endometrium."

***Brittany Paris,** Ph.D. student co-chaired by **Drs. Thomas Welsh, Jr**. and **Jessica Leatherwood** received a 2023/24 American Quarter Horse Foundation Fellowship Grant: "Multi-dose Clodronate Use on Bone Histomorphology and Cellular Apoptosis in Juvenile Exercising Quarter Horses." $20,000.

***Sara Garule,** M.S. Physiology of Reproduction graduate under the mentorship of **Dr. Rodolfo Cardoso** was awarded the 2023 Outstanding Masters Student by the Department of Animal Science in recognition of excellence in academics, teaching, research, and service among Animal Science Master's Students.

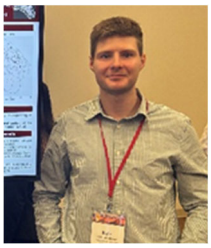
***Dallas R. Soffa,** Graduate Research Assistant in the laboratory of **Dr. Rebecca Poo**le, was the recipient of the Joseph P. Fontenot Travel Award at the 2023 American Society of Animal Science. meeting She was also elected the 2023/24 Graduate Student Director for the ASAS Southern Section.



***Damon Smith**, Graduate Research Assistant in the laboratory of **Dr. Ky Pohler,** was awarded a research grant from the American Embryo Transfer Association. The title of the grant was "Follicular Wave Synchronization with/ without Follicle Stimulation in Bos Indicus and Bos Indicus-Influenced Beef Cattle." Damon was also the recipient of a grant from the American Embryo Transfer Association entitled, Follicular Wave Synchronization with/without Follicle Stimulation in Bos Indicus and Bos Indicus-Influenced Beef Cattle".

***Gabriela Dal Maso de Melo,** Ph.D. recipient in Physiology of Reproduction, under the mentorship of **Drs. Ky Pohler and Cliff Lamb** was the 2023 recipient of the Dr. A.M. Tony Sorensen, Jr. Achievement Award. Her research was focused on characterizing the mechanisms of late embryonic mortality in cattle using Pregnancy Associated Glycoprotein measurement as a predictive tool.

***Viviana Garza**, Ph.D. candidate in Physiology of Reproduction, under the mentorship of **Drs. Rodolfo Cardoso** and **Gary Williams** was the 2023 recipient of the Outstanding Doctoral Student Award given in recognition of excellence in academics, teaching,

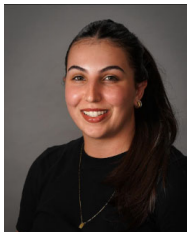


***Kyle Hickman–Brown**, Ph.D,. Student in **Dr. Rebecca Poole's** Lab was the recipient of a 1st place Graduate Poster Presentation at TAMU Student Research Week, and 3rd place winner in 3rd place in the poster competition at the ASGSA Mini Research Symposium and the MS II Session at the ASAS Annual meeting in Albuquerque, NM .

***Audrey Earnhardt** received the following awards in 2023: Central Dogma of Phenomics Travel Award to National ASAS Meeting; The 2023 Association of Former Students Distinguished Graduate Award for Excellence in Teaching and the 2023 Gamma Sigma Delta Outstanding PhD Student Award.

***Carli Lefevre**, masters student working with **Dr. Greg Johnson**, won first place in the Flash Talk category for her abstract submitted to the Texas A&M University VMBS Trainee Research Symposium in May 2023. She was also a recipient of the Texas A&M University Walter W. Lechner Estate Scholarship in August 2023 for her contributions as a research student in the Biomedical Sciences Graduate Program.

NEW TRAINEES



***Sophia Panelli Marchio,** DVM joined **Dr. Yatta Boakari's** laboratory in 2023. She received her DVM degree from Franca University, Sao Paulo, Brazil. During her DVM degree she studied equine endometrial response to ozone treatments. Her main focus will be the effects of Equine Metabolic Disorders on reproductive physiology.

***Dr. Lucas Oliveira e Silva** is a new visiting scholar in the lab of **Dr. Rodolfo Cardoso**. Lucas earned his DVM degree from Federal University of Lavras (Brazil) in 2017 and a M.S. degree in Animal Science from University of Sao Paulo (ESALQ/USP) in 2020. Lucas is currently pursuing a PhD degree at ESALQ/USP under the mentorship of Dr. Roberto Sartori Filho and will be visiting the Cardoso Lab at TAMU from March 2023 until February 2024.

***Joelle Sfeir** is pursuing a PhD in Nutrition with **Dr. Heidi Vanden Brink**. She holds a BS in Nutrition with a minor in Food Sciences and Management. Prior to her doctoral studies, Joelle became a licensed dietitian in Lebanon and worked as a dietitian in a hospital setting and clinical sports environment. Her research focus is on the impact of dietary intake during (continued p. 15)

IFRB Graduate Student Spotlight

***Dallas Soffa** is a Ph.D. student in the Department of Animal Science mentored by **Dr. Rebecca Poole**. She received her B.S. in Animal Science from North Carolina State University in 2019, before earning her M.S. in Animal Science from Virginia Tech in 2022.

During Dallas' master's program, she worked with Dr. Michelle Rhoads researching the effects of feed additives on uterine morphology, ovarian dynamics, and additional reproductive attributes in both dairy cattle and swine. She began at Texas A&M as the first Ph.D. student in Dr. Poole's lab in the Fall of 2022, where her research has focused on the female reproductive microbiome in cattle and its associations with reproductive steroid hormones and pregnancy status.

Dallas is currently finishing up her research project focused on the vaginal microbiome of lactating dairy cattle between the time of artificial insemination (AI) and maternal recognition of pregnancy (MRP). This time frame is known to be a substantial period of pregnancy loss in cattle, and previous work appears to demonstrate an association between early gestation and reproductive tract microbiomes. Dallas' work suggests that the vaginal microbiome shifts between the time of AI and MRP. She noted these changes in the vaginal microbiota relative abundance at both the Phylum and Genus level. Specifically, her work found that phyla ***Firmicutes*** and ***Bacteroidetes*** had greater relative abundance at time of AI, compared to phyla *Fusobacteria* and ***Tenericutes*** which had greater relative abundance at time of MRP. These differences were also reflected at the genera level, and when assessing the interaction between the two time points and pregnancy status, genera ***Treponema, Blautia,*** and ***Ruminococcus*** had greater relative abundance at time of AI in open cows **(Figure 1)**. Altogether, these microbiota shifts appear to have an influence on the establishment of pregnancy in lactating dairy cattle.

Dallas' future work will focus on associations between the vaginal reproductive microbiome and interferon-stimulated genes for her dairy cattle project. She will also work on one collaborative project evaluating the vaginal microbiome in ovariectomized beef cattle and another focusing on the reproductive microbiome in beef cattle following various estrus synchronization protocols. Dallas plans to complete a meta-analysis on the reproductive microbiome in cattle as well.

Dallas has presented at the annual Society for the Study of Reproduction, American Society of Animal Science (ASAS), and IFRB Retreat meetings. She received the Joseph P. Fontenot Travel Award at the 2023 National ASAS meeting, and placed 3rd for her oral presentation in the Animal Science Graduate Student Association (ASGSA) Mini Research Symposium. Dallas currently serves as Graduate Student Director for the ASAS Southern Section, President of ASGSA, and is an Early Career Reviewer for Reproduction and Fertility. She has also served as a graduate teaching assistant for ANSC 108 and ANSC 334. Dallas loves engaging with her fellow graduate students and values the mentorship she has gained so far in her program. In her free time, Dallas enjoys hiking, reading at local coffee shops, and having game nights with friends.

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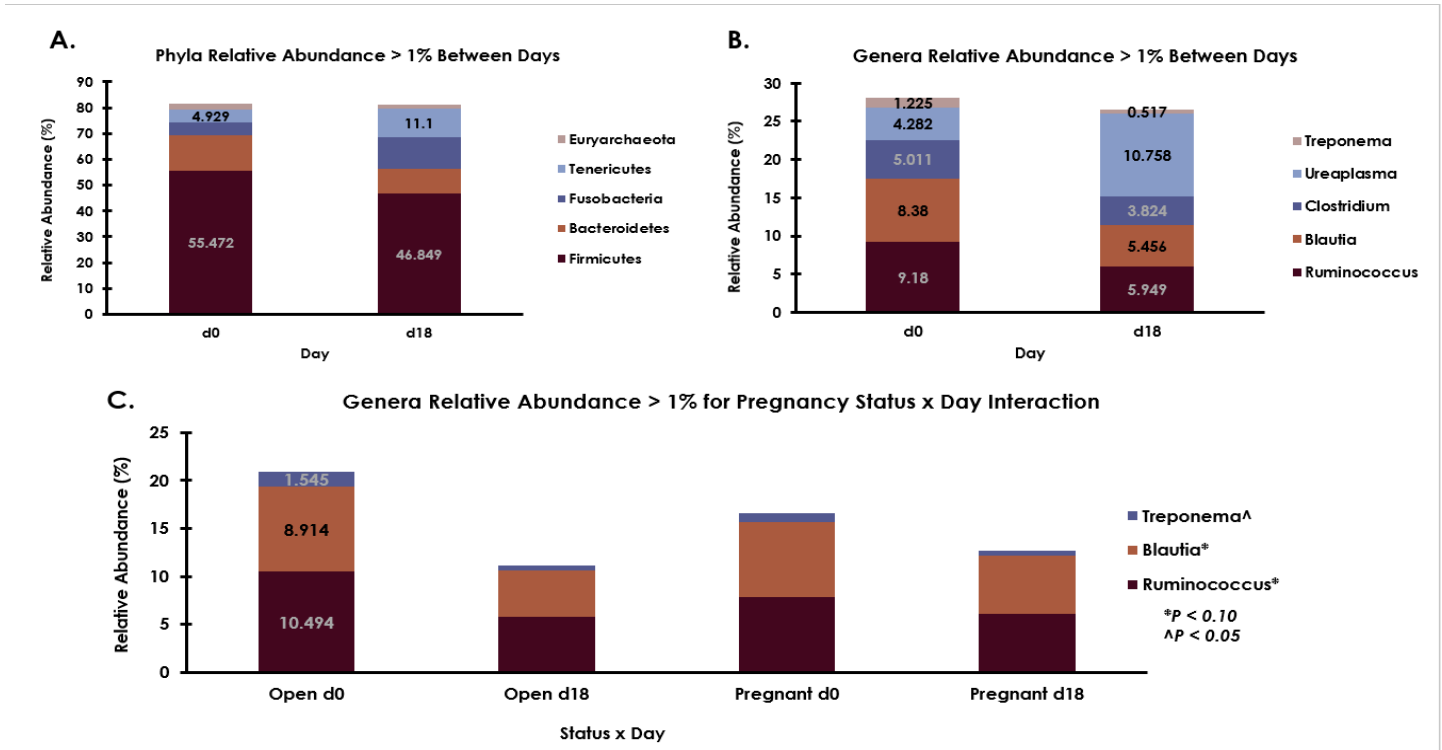

Vaginal Microbiome Sequencing of: (A) Phyla relative abundance greater than 1% between time of artificial insemination (d0) and time of maternal recognition of pregnancy (d18); (B) Genera relative abundance greater than 1% between time of artificial insemination (d0) and time of maternal recognition of pregnancy (d18); and (C) Genera relative abundance greater than 1% with pregnancy status (Open vs. Pregnant) and day (d0 and d18) interactions.

Research Snapshot, cont'd from page 12

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(continued on page 16)

IFRB Postdoctoral Trainee Spotlight

***Dr. Sudipta Dutta** began her postdoctoral training in the laboratory of **Dr. Joe Arosh** in May 2020. She is currently working on two projects- i) NIH-funded "Phytotherapy for Endometriosis" and ii) USDA-NIFA funded "Epigenetic Regulation of Progesterone Receptor-B in the Endometrium during Luteolysis in Ruminants." Additionally, she is interested in investigating chronic pain mechanisms in endometriosis and identifying non-opioid therapy for endometriosis.

Dr. Dutta is also collaborating with **Dr. Sakhila Banu** on NIH-funded projects to study the effects of exposure to hexavalent chromium on the ovary and uterine vasculature. Dr. Dutta's research aims to elucidate the role of ERK/AKT signaling pathways on the hormonal and epigenetic environment in endometriosis. Dr. Dutta is from the historic city of Kolkata in eastern India. After completing her BS. And MS. degrees in biotechnology, she moved to the USA in 2007. She completed her Ph.D. in Dr. Melissa Pepling's laboratory at Syracuse University in 2014 working on hormone signaling that guides the oocyte nest breakdown and early follicle formation using mice as the model system. Her research findings were published in *Biology of Reproduction*, and Reproductive *Biology and Endocrinology*.

Dr. Dutta started her first postdoctoral training in Dr. David Miller's laboratory at the University of Illinois at Urbana-Champaign, where she worked on USDA funded project to find a cryopreservation method of bovine semen preservation. Her research was published in the *Journal of Biological Chemistry*.

After that, she worked in Dr. Ariella Shianov's laboratory at the University of Michigan, Ann Arbor, on 3-D follicle culture systems and embryonic stem cells. Dr. Dutta then moved to Texas A&M in 2020, where she has been working on ERK/AKT and TLR4 signaling pathways in endometriosis, and on the epigenetic mechanisms of progesterone receptor B in the luminal epithelium of the endometrium during the estrus cycle in ruminants. She has presented her findings at the annual Society for the Study of Reproduction (SSR) and IFRB meetings.

Some of her work in Dr. Arosh's lab is summarized in **Figure 1** where peritoneal endometriosis was induced using the human endometriotic epithelial and stromal cells in the Rag2γ(c) xenograft mouse model. The experimental endometriosis mice were treated and not treated with PI3K inhibitor LY294002 to suppress the AKT pathway, MEK1/2 inhibitor U0126 to suppress the ERK1/2 pathway, and a combination of both to suppress both AKT and ERK pathways from days 15–28 of post-xenograft. It was next determined whether inhibition of AKT and ERK1/2 pathways affect the expression and regulation of DNA methylation proteins in the endometrium in the xenograft mouse model of endometriosis of human origin. The results indicated that DNMT1, DNMT3a, and DNMT3b proteins were expressed in the endometrium's epithelial and stromal cells. Importantly, the combined inhibition of AKT and ERK1/2 pathways decreased ($p < 0.05$) the expression of DNMT1 and DNMT3a proteins in the epithelial cells but not in the stromal cells of the endometrium. Interestingly, the combined inhibition of AKT and ERK1/2 pathways did not modulate the expression of DNMT3b protein significantly in the epithelial and stromal cells of the endometrium.

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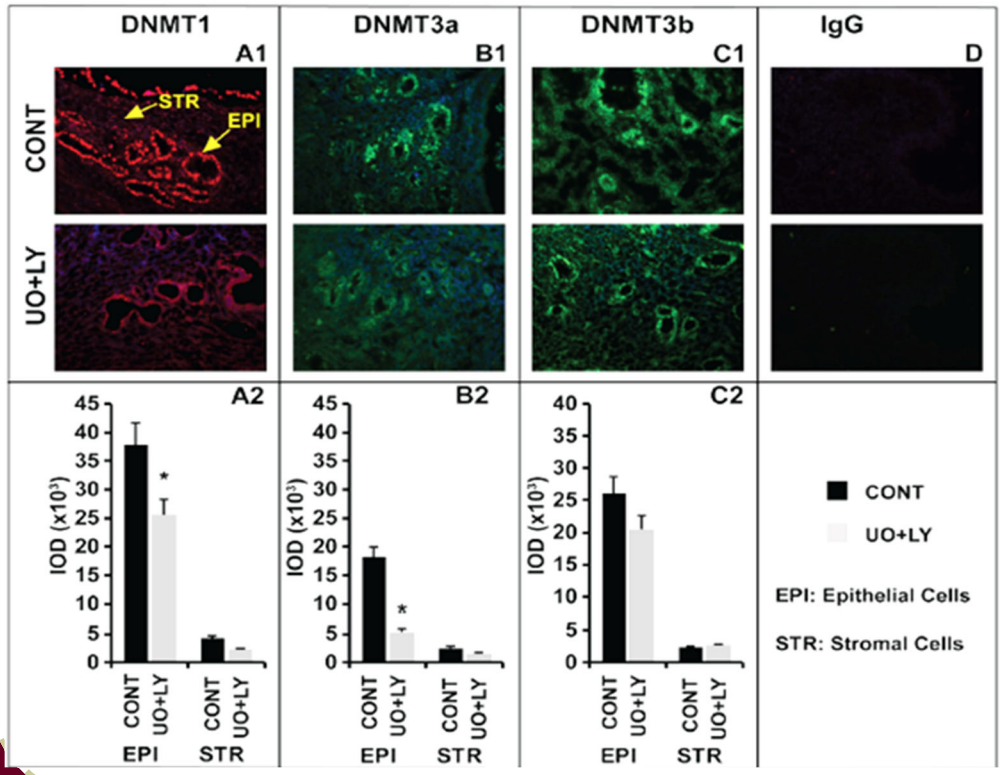

Figure 1. Effects of inhibition of AKT and ERK1/2 pathways on the expression of DNA methyltransferases in the endometrial epithelial and stromal cells in a xenograft mouse model of endometriosis.

Expression of (A1-A2) DNMT1, (B1–B2) DNMT3a, and (C1–C2) DNMT3b proteins in the endometrium. (D): Negative control IgG. Representative images are shown. EPI: Epithelial cells. STR: Stromal cells. *- control vs. treatment, $p < 0.05$, $n = 5$ mice. Numerical data are expressed in integrated optical density (IOD).

IRFB Postdoctoral Trainee Spotlight, continued from page 14

In collaboration with Dr. Banu, Dr. Dutta has published two manuscripts in Reproductive Toxicology in 2023 – i) a review article on endometriosis and endocrine disruptors ii) a research article on the epigenetic changes caused due to intergenerational inheritance of Cr(VI) exposure on the prepubertal rat ovary as summarized in **Figure 2.** The projects have been supported by grants from NICHD (R01-HD079625 to J.A.A) and NIEHS (R01-ES025234 to S.K.B) ***

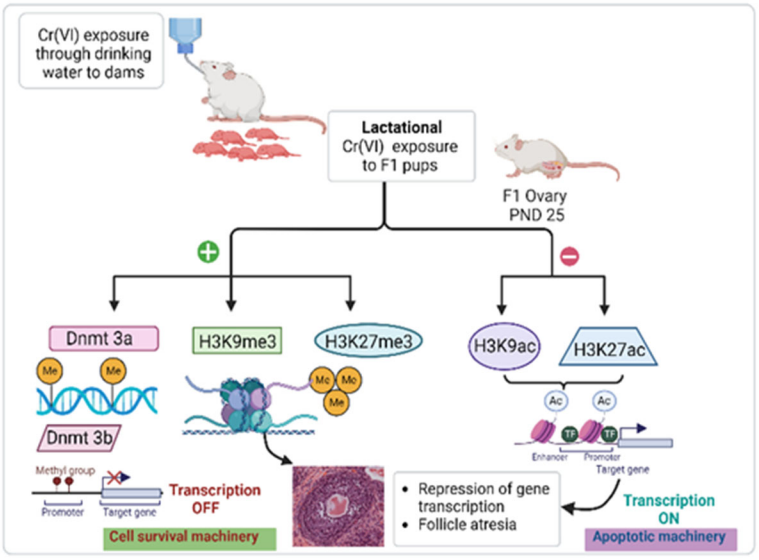

Figure 2. Schematic diagram of the mechanism of Cr(VI)-induced ovotoxicity.

Lactating rats received 25 ppm potassium dichromate in drinking water from postpartum day 1–21. From the day of parturition to the Day 21 postpartum period, the F1 offspring received Cr (VI) through the dam's milk . On PND 25, female pups were euthanized, and the ovaries were collected for analysis. Protein expression of DNA and histone acetyl and methyl epigenetic marks in the ovary were analyzed. Cr(VI) exposure upregulates the expression of DNA methyltransferases (Dnmt3a, DNmt3b) and histone methyltransferases (H3K9me3 & H3K27me3) and downregulates the expression of histone acetyl marks (H3K9ac & H3K27ac) which could repress cell survival machinery and turn on the transcription of pro-apoptotic machinery.

IFRB Trainee News continued from page 11

childhood on reproductive axis miscalibration and the potential risk of polycystic ovary syndrome (PCOS) during adolescence. Joelle is o contributing to the broader understanding of PCOS, aiming to eventually improve health outcomes for individuals impacted by PCOS.

***Dana Mickey** joined Dr. Luense's lab in September, 2023 and is currently working on her Doctorate in Animal Science. Dena is from Houston and sreceived her Bachelor of Science in Animal Science from Texas A&M ty in 2018. As an undergraduate, she was awarded the Chevron International Reach Scholarship. Dana received her Master of Science in Animal Breeding under Drs. James Sanders and Andy Herring in 2021 where she researched calf performance and female reproductive traits in second generation reciprocal Nellore-Angus crosses. Preliminary results from this research were presented at the TAMU Beef Cattle Short Course in 2020 and the 2021 American Society of Animal Science Annual Meeting and Trade Show. Results from her Master's project were published in Ruminants in 2022. Her research project focuses on the effects of histone modifications on fertility and pregnancy in cattle.

***Linfeng Nie** received his master's degree in veterinary medicine at Nanjing Agricultural University. He began his graduate research program under the supervision of Dr. Qinglei Li at Texas A&M University in fall 2023. His research goal is to understand the cellular and molecular mechanisms of the female reproductive tract development, with a focus on critical development events and functions of the uterus.

***Olivia Ognibene** is a first-year M.S student in Physiology of Reproduction with **Dr. Rebecca Poole**. Olivia's research will focus on toll-like receptor protein localization in the boar reproductive tract and its association with testosterone and dihydrotestosterone. Olivia is from Krum, Texas and she graduated from Texas A&M University in May, 2023 with a B.S. in Animal Science. After the completion of her program, she hopes to pursue a career in animal reproduction research.

***Matt Stuehr** is a first-year Physiology of Reproduction M.S. student with **Dr. Rebecca Poole** . Matthew's research involves characterizing the retinol expression pathway in the corpora lutea of cyclic and pregnant gilts. In May, 2023, he graduated from the University of Tennessee, Knoxville with a B.S. in Animal Science. Matthew is originally from Westwood, Massachusetts and he aspires to research human reproduction.

***Ashton R. Dodd** joined the lab of **Dr. Lacey Luense** in January, 2023 and is working on her Physiology of Reproduction M.S. in the Department of Animal Science. Her project focuses on the effects of histone modifications in the sperm epigenome on embryo development. Ashton received her B.S. in Biomedical Sciences with a minor in Psychology from Texas A&M University. She is from Hutto, Texas, and is a continuing St. David's Neal Kocurek Scholar.

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Research Snapshot, cont'd from page 15

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IFRB Faculty News continued

FACULTY TRANSITIONS

***Dr. Heewon Seo,** Research Assistant Professor with the Department of Veterinary Integrative Biosciences (VIBS) in the School of Veterinary Medicine and Biomedical Sciences (VMBS), started a new position as a tenure-track assistant professor within the Department of Animal and Avian Sciences at the University of Maryland, College Park, MD on January 14, 2024.

Dr. Seo earned a Ph.D. in Reproductive Biology at Yonsei University, Korea in 2012 and completed a 5-year postdoctoral fellowship in VIBS. Dr. Seo was promoted to Research Assistant Professor in VIBS in 2018. He is an internationally known expert in the biology of pregnancy in livestock species including pigs, sheep, and cattle, key species in agricultural industry and key large animal biomedical models for One Health initiatives. This is evidenced by his invitation to orally present at 6 international meetings in the USA, Korea and Belgium, In June 2023, he presented research entitled "Pig trophectoderm utilizes glucose-derived serine for one-carbon metabolism to support conceptus elongation at the 11th International Conference on Pig Reproduction (ICPR), Belgium,

Dr. Seo is a productive scientist having published a total of 64 peer-reviewed manuscripts in journals including *Biology of Reproduction, Reproduction, Endocrinology, and Placenta.* He was also successful in securing grant funding. This includes extensive involvement in the writing of 4 funded USDA grants, two of which ranked in the 1st percentile. Currently, Dr. Seo is contributing on 3 funded USDA grants, one of which he serves as the project director (PD), a second grant he serves as Co-PD. He was also instrumental in the writing and design of another. Over the last 7 years, he has contributed to grants totaling $2,685,000. Dr. Seo is highly active in collaboration with faculty members and a key mentor for students in the VMBS and Texas A&M University.

DR. GÜNTER WAGNER: HAGLER FELLOW AND IFRB COLLABORATOR

***Dr Gunter Wagner**, member of the 2023-24 Class of Hagler Fellows of the Hagler Institute for Advanced Study at Texas A&M University is a valued participant and collaborator of the Texas A&M IFRB. Dr. Wagner is the Alison Richard Professor Emeritus of Ecology and Evolutionary Biology, Yale University, and is Lecturer and Senior Research Fellow, Department of Evolutionary Biology, University of Vienna, Austria. He is also a is a member of the National Academy of Sciences and the American Academy of Arts and Sciences as well as a fellow of the MacArthur Foundation, the American Association for the Advancement of Science and the Austrian Academy of Sciences. Honors include the Alexander von Humboldt Research Award, Alexander von Humboldt Foundation; the Alexander O. Kovalesky Medal, St. Petersburg Society of Naturalists; the Daniel Giraud Elliot Medal, National Academy of Sciences; and the Koopmans Distinguished Lectureship, International Institute for Applied Systems Analysis.

Dr. Wagner was a past invited speaker for the IFRB Seminar Series in September, 2022, when he presented a lecture entitled "The evolution of inflammatory pathways and the origin of implantation." During part of the 2023-24 academic year he is on campus and collaborating with **Drs. Fuller Bazer** and **Greg Johnson** to continue investigations of the immune/inflammation response during the peri-implantation period of pregnancy. Graduate Student, **Alex Ross**, a M.S. trainee in Dr. Johnson's lab was selected as a recipient of the Hagler Fellowship for Advanced Study at Texas A&M University as a trainee in this collaboration.

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IRFB Faculty Activities continued from page 7

INTERNATIONAL ACTIVITIES & LECTURES

***Dr. Dr. Rodolfo Cardoso** was an invited lecturer at the 11th International Ruminant Reproduction Symposium (IRRS), held in Galway, Ireland. Presentation title: Nutrition and Female Puberty in Cattle. May, 2023.

***Dr. Rodolfo Cardoso** was an invited speaker at the 2023 American Society of Animal Science (ASAS) Physiology and Endocrinology Symposium: An Update on the Brain. Albuquerque, NM. July, 2023

***Dr. Greg Johnson** was an invited speaker at the Peri-Implantation Biology Focus Session, 2023 Society for the Study of Reproduction (Annual Meeting, Ottawa, Canada, "Metabolism of Glucose, Fructose, and Glutamine by Elongating and Implanting Porcine Conceptuses."

***Drs. Greg Johnson and Heewon Seo** were both invited speakers at the, 11th International Conference on Pig Reproduction, Ghent, Belgium., June 2023. Dr. Johnson presented: "Metabolic Pathways Utilized by the Conceptus, Uterus and Placenta." Dr. Seo's talk was "Pig trophectoderm utilizes glucose-derived serine for one-carbon metabolism to support conceptus elongation."

***Dr. George Perry** was an invited speaker at the Brazilian Society of Embryo Transfer, "Importance of preovulatory estradiol on uterine receptivity and luteal function" and "What are the challenges for high performance of precocious beef heifers in TAI programs?"

***Dr. Perry** was also an invited speaker at the National Cattleman's Beef Association, New Technologies for Pregnancy Determination a and Using it to Better Manage Your Herd."

***Dr. Raudsepp,** Josefina Kjöllerström, Rytis Juras. Contribution of STR genotyping to animal clinical cytogenetics. 39th International Society for Animal Genetics Conference, July 2-7, 2023 Cape town, South Africa.

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Biology of Reproduction

Research Snapshot, cont'd from page 18

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16th Annual IFRB Retreat, 2023

The 16th Annual IFRB Retreat was held on November 3, 2023 in conjunction with the 28th Annual Dr. Raymond O. Berry Memorial Lecture. Over 60 IRFB faculty and trainees from the School of Veterinary Medicine & Biomedical Sciences and Colleges of Agriculture and Life Sciences, Science and Medicine, along with Prairie View A&M (PVAMU) participated in the Retreat which was held on the PVAMU campus.

Retreat organizers were Drs. Bill Foxworth from PVAMU and **Drs. Rodolfo Cardoso, Greg Johnson** and **Fuller Bazer** from TAMU. **Dr. Cardoso provided welcome comments and Dr. Lacy Luense presided over the meeting.**

Two IFRB faculty members and seven *trainee/research scientist provided platform research reports. Faculty presenters included :*

Dr. Reinaldo Cooke, Professor, Animal Science, TAMU, "Confined cow-calf operations – impacts on reproductive development of replacement heifers"

Dr. Erdogan Memili, Professor, PVAMU. "Sperm biomarkers associated with semen quality and male fertility."

Trainee presenters included:

Makenzie Newton, (M.S. Student) "Dietary supplementation of meat goats with L-citrulline and the impact on offspring performance"

Dallas Soffa, (PhD Student) "Diversity of vaginal bacteria in lactating dairy cattle on pregnancy establishment."

Haley Moyer, (M.S. Student) "Evaluating mechanistic underpinnings of environmental chemical effects on feto-maternal interface using a human organ-on-chip model."

Damon Smith, (PhD Student) "Comparative differences between Bos indicus and Bos taurus cows subjected to a nutritional challenge."

Viviana Garza, (Ph.D. Student) "Impact of pre- and postnatal nutrition on number of kisspeptin- and neurokinin 3 receptor-immunopositive neurons in the arcuate nucleus of sexually mature heifers."

Dr. Luisa Fernanda Ramirez-Agamez, "The effect of sex-sorted, frozen/thawed, stallion sperm on cellular events after fertilization and blastocyst production by Intracytoplasmic sperm injection."

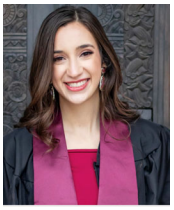
Pierre Ferrer, (PhD Student) "From cytoskeletal to gene regulation: The indispensable functions of testis-specific actins for male fertility of vaginal, cervical, and uterine tissues in pregnant gilts."

Support for the Annual IFRB Retreats and Dr. Raymond O. Berry Memorial Lecture Series was provided by **Dr. Fuller Bazer** and from and from VIBS, VTPP, Animal Sci, and Large Animal Clinical Sciences Departments. ***

IFRB Trainee News continued from page 11

***Erin Conolly**, is a first year M.S. student in the laboratory of **Dr. Guoyao Wu**, She received the B.S. degree in Animal Science from Ohio State University. Erin is studying the synthesis of glycine (the most abundant amino acid in the body) from 4-hydroxyproline in fish tissues.

***Alex Ross** is a new Master's Student in **Dr. Greg Johnson's** Lab. Along with **Drs. Johnson and Bazer**, she is working with Hagler Fellow **Dr. Gunter Wagner**, investigating immune and inflammation responses at the peri-implantation period of gestation. Alex is a recipient of a Hagler Institute Graduate Student Fellowship. She received her B.S. degree in Animal Science from NC State University, and has worked as a Veterinary Technician at the University of North Carolina and as a Research Technician in their Gnotobiotic Core facility.



***Maddison Olivarez**, B.S. Animal Science, Texas A&M University, joined the laboratory of **Dr. Fuller Bazer** in 2023. She is involved in research on effects of feeding dietary supplements of creatine on fetal-placental development in pigs.

***Sarah Blaske** is a new master's student in Physiology of Reproduction working with **Dr. George Perry**. Sarah completed her B.S. in Animal and Dairy Sciences at Mississippi State University. Her research focuses on how vaccination impacts bovine reproductive physiology.

***Vashishta Venkata Sai Kolla** joined the laboratory of **Dr. Sakhila Banu**. He earned an undergraduate degree in Biotechnology from SRM Institute of Science & Technology, India. He completed his Master of Biotechnology at TAMU and joined the Banu lab in August, 2023. His research is focused on studying the endocrine disruption of hexavalent chromium, Cr(VI), on uterine artery remodeling and hypertension during pregnancy.

***Leticia Mota Melo** is a DVM student at Sao Paulo University (Brazil) that joined Dr. Yatta Boakari's laboratory for an internship in 2023. Leticia main focus is on alpaca placentas and equine myometrium.

FORMER TRAINEES WITH NEW FACULTY OR POSTDOCTORAL APPOINTMENTS

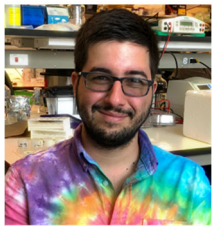
***Dr. Claire Stenhouse**, Postdoctoral Fellow and Assistant Research Scientist in **Dr. Fuller Bazer's** lab between 2018-2023, is now an Assistant Professor, Department of Animal Science, Penn State University.

***Kaitlin Epperson** former Physiology of Reproduction doctoral trainee with **Dr. George Perry** was recruited in March, 2023 as an Assistant Professor of Agricultural Sciences at NorthWest Missouri State University.

***Dr. Audrey Earnhardt San,** former doctoral trainee with **Drs. Thomas Welsh, Jr., and Ron Randel,** was recruited in August, 2023 as an Assistant Professor of Animal Science at Delaware Valley University in Doylestown, Pennsylvania.

***Dr. Nirvay Sah,** former Grad Student and Postdoctoral Fellow in the laboratory of **Dr. Fuller Bazer** accepted a Postdoctoral Fellow position at the University of California at San Diego.

***Dr. Pierre Ferrer**, former doctoral trainee with **Dr. Tracy Clement** has joined the laboratory of Dr. Martin Matzuk Professor & National Academy of Sciences member in the Center for Drug Discovery and Department of Pathology & Immunology at the Baylor College of Medicine. His research will focus on investigating molecular mechanisms required for mammalian gametogenesis with the purpose to then validate protein targets and develop viable pharmaceutical non-hormonal contraceptives for both sexes. ***



56th SSR Annual Meeting, Ottawa. Canada
2023 American Society for Animal Science, Albuquerque, NM

The 56h Society for the Study of Reproduction (SSR) Annual Meeting was held Jul 11-14,2 023 at the Shaw Center, Ottawa, Canada, This year 28 trainees and 14 faculty contributed to presentations at the annual meeting.

The 57th Annual SSR Meeting, "Evolution of Reproductive Sciences: Where should we go? will be held July 15-19, 2024 in Dublin, Ireland.

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The 2023 American Society for Animal Science meeting was held in conjunction with CSAS & WASAS July 16-20, 2023 at the Albuquerque Convention Center, Oklahoma City Convention Center. Numerous presentations were given by TAMU faculty including 12 IFRB members and 20 trainees.

The 2024 American Society for Animal Science (ASAS) meeting will be held in conjunction with CSAS & WSASAS at the Calgary TELUS Convention Center, Alberta, Canada, July 21-25, 2024. The deadline for abstracts is March 21, 2023.

IFRB Committee Structure & Membership

Graduate Programs Committee
Carey Satterfield, (Chair)
Dana Gaddy
Gary Williams

Seminar Committee
Sakhila Banu, (Chair)
Robert Burghardt
Annie Newell-Fugate

Executive Committee
Rodolfo Cardoso (Chair)
Sakhila Banu
Gregory Johnson
Qinglei Li
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Ky Pohler
Robyn Moses, Trainee Rep.

Nominating Committee
Joe Arosh, (Chair)
Michael Golding
Shannon Washburn

Membership Committee
Nancy Ing (Chair)
Greg Johnson (EC liaison)
Kathrin Dunlap

Interdisciplinary Faculty of Reproductive Biology at Texas A&M University

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Comments, Suggestions?

Contact Newsletter Editor
Bob Burghardt

IFRB RESEARCH AND TRAINING MISSION:
Reproductive Biology is at the epicenter of the life sciences. Focal areas of research and graduate/postdoctoral training in the IFRB are interdisciplinary and cover both genders, encompass humans, domestic animals, laboratory animals and wildlife, and include: assisted reproductive techniques, biological clocks, cloning, conservation of endangered species, contraception, developmental biology, diseases of the reproductive tract, endocrinology, fertilization, fetal growth retardation, gametogenesis, gender-biased diseases and health issues, immunology, infertility, lactation, pregnancy and pregnancy-related disorders, premature labor, recovery of function, science and health policy, stem cell biology, systems biology and functional genomics, toxicology, and uterine biology. The outcomes of this research are impacting Texas, our nation and the world.