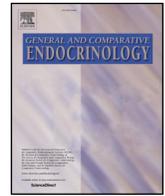




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# General and Comparative Endocrinology

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Guest editors' introduction – Special issue of the fifth biennial meeting of the North American Society for Comparative Endocrinology (Sociedad Norteamericana de Endocrinología Comparada; Société Nord-Américaine d'Endocrinologie Comparée)

The North American Society for Comparative Endocrinology (NASCE) was founded in 2010 as an interdisciplinary scientific and educational organization dedicated to the study of comparative, evolutionary, ecological, and model systems endocrinology (<http://nasce-snaec.com/>). The inaugural meeting was held in 2011 in Ann Arbor, Michigan, USA at the University of Michigan (July 11–15). The 2nd biennial meeting was in 2013 in Queretaro, QRO, MEX at the Universidad Nacional Autónoma de México, Campus Juriquilla (May 22–25). The 3rd biennial meeting was in 2015 in Ottawa, Ontario, CAN at the University of Ottawa (June 21–25). The 4th biennial meeting was in 2017 in Lake Louise, Alberta, CAN at Chateau Lake Louise in Banff National Park (June 4–9). The 5th biennial meeting was this year in 2019 in Gainesville, Florida, USA at the University of Florida (May 24–28th) (Fig. 1).

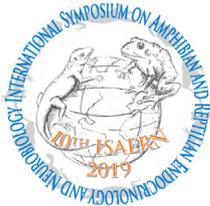
The meeting started with an opening ceremony and welcome from the Acting Dean, Dr. Tom Vickroy (College of Veterinary Medicine) at the Harn Museum of Art. The introduction included a warm welcome to delegates, many of whom were visiting Gainesville (and Florida) for the first time. There were 179 delegates, travelling from a total of 17 countries, including the USA, Canada, Mexico, Netherlands, People's Republic of China, Sweden, Brazil, Japan, United Kingdom, and Hong Kong, among others; a true testament to the importance of NASCE on an international scale. At the opening of every NASCE meeting since the 2nd biennial meeting, the society awards the Gorbman-Bern Memorial Lectureship which commemorates the incredible contributions of Dr. Aubrey Gorman and Dr. Howard A. Bern, two of the founding fathers of the field of comparative endocrinology (<http://nasce-snaec.com/nasce-awards/>). The 2019 Gorbman-Bern Memorial Lectureship Awardee was Dr. Peter Thomas who pioneered the characterization of novel receptors on the cell surface that mediate the rapid actions of steroid hormones. His plenary lecture entitled “Rapid sex steroid actions mediated through novel transmembrane receptors: lessons from studies on fish gonads” covered both classic genomic mechanisms of steroid action through activation of intracellular nuclear receptors, as well as rapid hormone signaling through membrane bound receptors. Dr. Thomas provided examples that included the membrane progesterin receptor, membrane estrogen binding receptor, and the recently discovered membrane androgen receptor, ZIP9, which is a member of the ZIP (SLC39A) zinc transporter family. Most exciting about ZIP9 is the realization that the same protein can have both steroid receptor activity and metal transport functions. Dr. Thomas' lecture provided outstanding examples of his contributions to comparative endocrinology over the past 40 years.

Each day of the meeting featured additional exciting plenaries. Dr.

Jason P. Breves, the Gorbman-Bern New Investigator Awardee for 2019, gave a plenary lecture entitled “Prolactin supports ion uptake by teleost ionocytes” where he discussed the comparative endocrinology of osmoregulation and ion transporting epithelium in fish models. Dr. Sheue-Yann Cheng engaged the audience by describing the development of thyroid hormone receptor mutant zebrafish and how to apply such a model to study human-relevant diseases and the screening of drugs to treat symptoms of thyroid deficiencies. Dr. Michael Romero discussed the application and relevance of the Reactive Scope, a novel concept to understanding stress in wildlife. Dr. Ian Orchard described the power of the kissing bug (*Rhodnius prolixus*) to understand the role of neurohormonal control of diuresis while Dr. Carlos Aramburo gave an exceptional lecture on the role of growth hormone and other cytokines in protection against neurotoxicity. Dr. Bob Denver rounded out the lectures as the plenary for the ISAREN symposium, describing the epigenetic mechanisms of thyroid hormone regulation in developing tadpoles.

Keeping true to the Comparative Endocrinology theme of NASCE, there was a broad range of topics covered at the meeting (e.g. reproduction, stress, osmoregulation, and growth) in diverse animal taxa such as insects, molluscs, fish, amphibians, reptiles, birds, and mammals. Emerging technologies and methodologies to study hormones in animals were apparent, including multi-omics, epigenetics, and gene editing with CRISPR/Cas9. There were 21 exciting sessions (running three concurrently at any given time) over the Memorial Day weekend. The presidential symposium on Omics: Analysis of Genomes, Proteomes, Transcriptomes, and Metabolomes in Comparative Endocrinology (organized by Dr. John Chang and Dr. Hamid Habibi), which highlighted multi-omics approaches to study hormone action, was well received. Other sessions included Thyroid Hormones and Development (Chairs: Dr. Dan Buchholz and Dr. Aurea Orozco), Neuropeptide Signaling Pathways in Arthropods (Chairs: Dr. Angela Lange and Dr. Ian Orchard), Stress Axis Function: From Mechanisms to Consequences (Chairs: Dr. Bob Dores, Dr. Jim Carr, Dr. Kathleen Gilmour, and Dr. Matt Vijayan), Topics in Comparative Endocrinology (Chairs: Dr. Chris Martyniuk and Dr. Nancy Denslow), Endocrinology of Domestic and Wild Fauna (Chair: Dr. Marta Romano), Metabolism Regulation (Chairs: Dr. Suraj Unniappan and Dr. Peggy Biga), Non-Coding RNA in Cell Signaling (Chair: Dr. Chun Peng), Neuroendocrinology of Feeding (Chairs: Dr. Nick Bernier and Dr. Helene Volkoff), Novel Hormones and Hormonal Control (Chair: Dr. David Lovejoy), Advancement of Gene Editing and Their Applications (Chair: Dr. Yong Zhu and Dr. Yun-bo Shi), Hormonal Control of Germinal Stem Cell Development and Gametogenesis (Chair: Dr. Hamid

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HELD JOINTLY WITH  
5TH BIENNIAL CONFERENCE OF THE NORTH AMERICAN SOCIETY FOR  
COMPARATIVE ENDOCRINOLOGY (NASCE)  
AND  
10TH INTERNATIONAL SYMPOSIUM ON AMPHIBIAN AND REPTILIAN  
ENDOCRINOLOGY AND NEUROBIOLOGY (ISAREN)



Fig. 1. The front cover of the 2019 NASCE conference in Gainesville, Florida (credit: Erin Dinkel and UF Conference Department).

Habibi), Comparative Endocrinology of Osmoregulation (Chairs: Dr. Steve McCormick and Dr. Jason Breves), ISAREN: Epigenetic Analysis in Amphibian and Reptile Endocrinology and Neurobiology (10th International Symposium on Amphibian and Reptilian Endocrinology and Neurobiology) (Chairs: Dr. Satomi Kohno and Dr. Dan Buchholz), Growth and Growth Factors (Chair: Dr. Maricela Luna), Aspects of Reproductive Endocrinology & Neuroendocrinology (Chairs: Dr. Natalia Garcia-Reyero and Dr. Vance Trudeau), Neuroendocrine Disruption of Animal Vocalizations and Socio-Sexual Behaviors (Chairs: Dr. Cheryl Rosenfeld and Dr. Frauke Hoffmann), Advances in Endocrine Disruption Science (Chairs: Dr. Valerie Langlois and Dr. Jan Mennigan), and GnRH-related Peptides in Metazoa: Recent Progress and Discoveries (Chairs: Dr. Jean-Paul Paluzzi and Dr. Pei-San Tsai). In total, there was 117 presentations and 60 posters. Of the oral presentations, approximately 30% were given by students and postdoctoral trainees. We thank the co-chairs and participants in these symposia for their contributions for an outstanding program, as well as their exemplary time keeping.

At the closing ceremony, Dr. Jean-Paul Paluzzi, as the new Chair of the NASCE Awards Committee, administered certificates to award winners. The Louis J. Guillette, Jr. Graduate Student Travel Award is presented at the biennial NASCE conference to memorialize the research and educational contributions of the late Dr. Louis (Lou) Guillette, a pioneer in the field of alligator and crocodile endocrinology, to a graduate student or postdoctoral fellow working in the general area of field/wildlife endocrinology. In 2019, Dr. Guillette's spouse, Dr. Elizabeth Guillette, presented the award to Lucas Greville of McMaster University. The NASCE 2019 Student Poster Award Winner was Aryan Lajevardi from York University [Honourable mentions: Emily Koide from the University of Victoria and Kelsey Lewis from the University of Florida], and in the Post-Doctoral category, the winner was Dr. Lisa Bottalico, University of Pennsylvania [Honourable mention: Dr. Jaime Honeycutt from North Carolina State University]. The NASCE 2019 Student Oral Presentation Award Winner was Marcus Williams from East Carolina University, [Honourable mentions: Eugene Cheung from North Carolina State University and Farwa Sajadi from York University] and in the Post-Doctoral category, the winner was Meet Zandawala from Brown University [Honourable mention: David Hogg, from the University of Toronto]. More than 30 travel awards were provided to offset the cost of hotels for students and PDFs, providing exceptional opportunities to display their research in a truly international setting. At the banquet, all the attendees enjoyed a Southern hospitality feel, with Cajun chicken and jazz throughout the evening. Many relived the earlier excursion to Silver Springs, where some delegates sighted alligators and many birds (including Anhinga and Blue Heron).

The NASCE local organizing committee (LOC) was comprised of Dr. Chris Martyniuk (Chair), Dr. Joseph Bisesi Jr. (UF), Dr. Nancy Denslow

(UF), and Dr. Paul Cooke (UF). The Gainesville LOC would like to thank the NASCE Council for their invaluable discussions [Dr. John Chang, U Alberta, (President), Dr. Aurea Orozco Rivas, UNAM (Vice-President), Dr. Bob Dores, U Denver (Past-President), and Dr. Angela Lange, U Toronto Miss (Treasurer)]. Special thanks to Dr. Jean-Paul Paluzzi (York University) for his tireless work on the NASCE website and the presentation of the awards. We gratefully acknowledge the sponsors that provided support for NASCE 2019: The University of Florida (Office of Research, College of Veterinary Medicine, and Department of Physiological Sciences), Elsevier (General and Comparative Endocrinology, Comparative Biochemistry and Physiology), Fisher Scientific, Facets, Genesee Scientific, VWR, and the City of Gainesville. NASCE gratefully acknowledges the important contributions of the UF Conference Department and specifically Erin Dinkel. Erin and her team exemplified professionalism and organized an outstanding conference in conjunction with the LOC. This included overseeing the oral and the posters sessions, assisting plenary speakers, organizing the trip to Silver Springs, and ensuring our international guests were content throughout the conference.

The 5th meeting of the NASCE in Gainesville continued to strengthen collaborations and friendships, and included endocrinologists from the three founding countries (Canada, USA, Mexico) and scientists from around the world. We witnessed the beginnings of the NASCE silent auction to raise funds for future trainee travel awards and hope this tradition continues for years to come. We now look forward to a very exciting 6th Biennial Meeting of NASCE 2021 in Queretaro, Mexico (tentative scheduled for mid to late May 2021). We hope you enjoy reading articles in this special issue, which focuses on research and reviews from meeting presenters. All manuscripts were peer-reviewed through the usual rigorous process of General and Comparative Endocrinology. We thank the numerous reviewers for their expert evaluations. We believe that the quality, novelty, and diversity of research topics presented in General and Comparative Endocrinology captures the feel and the excitement of the 5th Biennial NASCE conference in Gainesville. Please take a moment to survey pictures and highlights of the 5th Biennial NASCE conference activities on the new official Twitter handle for the North American Society for Comparative Endocrinology (@NASCE\_SNAEC): [https://twitter.com/NASCE\\_SNAEC?lang=en](https://twitter.com/NASCE_SNAEC?lang=en).

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