PROGRAM
STP 38TH ANNUAL SYMPOSIUM
ENVIRONMENTAL TOXICOLOGIC PATHOLOGY AND ONE HEALTH
RALEIGH, NORTH CAROLINA • JUNE 22–27, 2019
# Annual Symposium Overview

All events are in the Raleigh Convention Center in Raleigh unless otherwise indicated.

## Friday, June 21, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>4:00 PM–6:00 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
</tbody>
</table>

## Saturday, June 22, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>8:00 AM–6:00 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>9:00 AM–4:30 PM</td>
<td>NTP Satellite Symposium: Pathology Potpourri</td>
<td>Marriott Raleigh City Center, State Ballroom B</td>
</tr>
<tr>
<td>7:00 PM–10:00 PM</td>
<td>Sponsored Reception: Co-sponsored by Charles River and Visiopharm</td>
<td>Marriott Raleigh City Center, State Ballroom B</td>
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## Sunday, June 23, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:00 AM–6:00 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>Career Development Workshop: Looking Forward: Cutting-Edge Technologies and Skills for Pathologists in the Future</td>
<td>Room 301</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>Morning Continuing Education (CE) Courses</td>
<td>Room 305</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>CE1: Data Interpretation, Visualization, and Statistics for Nonclinical Toxicity Studies</td>
<td>Room 306</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>CE2: Medical Device Safety Assessment: The Frontiers of Safety Assessment Pathology</td>
<td>Room 306</td>
</tr>
<tr>
<td>1:30 PM–5:30 PM</td>
<td>Afternoon Continuing Education (CE) Courses</td>
<td>Room 305</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>CE3: Cardiac Effects Commonly Encountered in Drug Development: Mechanisms and Clinical Relevance</td>
<td>Room 306</td>
</tr>
<tr>
<td>5:00 PM–7:00 PM</td>
<td>Exhibits and Poster Sessions Open</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>5:30 PM–7:00 PM</td>
<td>Welcome Reception</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>7:00 PM–8:30 PM</td>
<td>Student/Mentor Mixer</td>
<td>The Raleigh Times (Off-site venue)</td>
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## Monday, June 24, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:00 AM–5:30 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>8:00 AM–9:00 AM</td>
<td>Symposium Welcome and Keynote Address: The National Institute of Environmental Health Sciences: Protecting Public Health, from Ecosystems to Communities</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>9:00 AM–4:00 PM</td>
<td>Exhibits and Poster Sessions Open</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>9:00 AM–12:00 Noon</td>
<td>Session 1 (AM): Toxicology and Pathology of Air Pollution</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>10:20 AM–10:50 AM</td>
<td>Break: Please visit the Exhibits and Poster Sessions</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>12:30 PM–1:30 PM</td>
<td>Career Development Lunchtime Series: Global Perspective on Careers in Environmental Toxicologic Pathology</td>
<td>Room 301</td>
</tr>
<tr>
<td>1:30 PM–5:00 PM</td>
<td>Session 2 (PM): Toxicologic Pathology of Workplace Agents</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>2:45 PM–3:15 PM</td>
<td>Break: Please visit the Exhibits and Poster Sessions</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>5:30 PM–7:00 PM</td>
<td>Annual Business Meeting and Town Hall: If, When, and How to Undertake Blind Histopathologic Evaluation</td>
<td>Ballroom A</td>
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## Tuesday, June 25, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM–1:00 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>Session 3 (AM): Toxicity Assessment Paradigms in Regulatory Pathology</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>9:00 AM–1:00 PM</td>
<td>Exhibits and Poster Sessions Open</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>9:35 AM–10:05 AM</td>
<td>Break: Please visit the Exhibits and Poster Sessions</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>12:15 PM–1:15 PM</td>
<td>Exhibitor-Hosted Session: AIRA Matrix</td>
<td>Room 302A</td>
</tr>
<tr>
<td>1:30 PM–4:00 PM</td>
<td>Student Outing</td>
<td>Room 402</td>
</tr>
<tr>
<td>Tuesday Afternoon</td>
<td>FREE TIME</td>
<td></td>
</tr>
<tr>
<td>7:30 PM–9:30 PM</td>
<td>Mystery Slide Session: Environmental Toxicologic Histopathology</td>
<td>Ballroom A</td>
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## Wednesday, June 26, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:30 AM–5:30 PM</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>Session 4 (AM): Endocrine Disruption and Reproductive Pathology</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>9:00 AM–1:00 PM</td>
<td>Exhibits and Poster Sessions Open</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>9:45 AM–10:15 AM</td>
<td>Break: Please visit the Exhibits and Poster Sessions</td>
<td>Ballroom B</td>
</tr>
<tr>
<td>12:30 PM–1:30 PM</td>
<td>IATP/STP Maronpot Guest Lecture Series: Bridging the Gap between Toxicologic Pathologists and the Medical Device Industry</td>
<td>Room 301</td>
</tr>
<tr>
<td>1:30 PM–5:00 PM</td>
<td>Session 5 (PM): Pathology in Ecological Research with Implications for One Health</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>3:10 PM–3:40 PM</td>
<td>Break</td>
<td>Ballroom Lobby</td>
</tr>
<tr>
<td>5:30 PM–6:30 PM</td>
<td>Awards and Recognition Ceremony</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>7:00 PM–9:00 PM</td>
<td>President's Reception</td>
<td>Ballroom B</td>
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## Thursday, June 27, 2019

<table>
<thead>
<tr>
<th>Time</th>
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<th>Location</th>
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<tbody>
<tr>
<td>7:30 AM–12:00 Noon</td>
<td>Registration</td>
<td>Registration Lobby</td>
</tr>
<tr>
<td>8:00 AM–12:00 Noon</td>
<td>Session 6 (AM): Integration of Big Data Technologies with Toxicologic Pathology</td>
<td>Ballroom A</td>
</tr>
<tr>
<td>9:45 AM–10:15 AM</td>
<td>Break</td>
<td>Ballroom Lobby</td>
</tr>
<tr>
<td>12:00 Noon</td>
<td>Meeting Adjourned</td>
<td></td>
</tr>
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</table>
Dear Colleagues and Guests,

Welcome to Raleigh for the 38th Annual Symposium “Environmental Toxicologic Pathology and One Health!” The 2019 Scientific Program Planning Committee has planned a fantastic week of sessions and special events for our professional growth, providing plenty of opportunities to network with longstanding friends and newly made acquaintances. While the plenary sessions remain the foundation of our meeting, I have highlighted a few of the other activities that I am sure will interest you. For the most up-to-date details, however, please check our mobile meeting app.

The meeting starts on Saturday with the always informative and highly interactive National Toxicology Program (NTP) Symposium “Pathology Potpourri.” Moving to Sunday, the half-day Continuing Education (CE) courses still have openings. If you haven’t registered yet and are interested in one or more of these informative courses, just stop by the Registration Desk:

- CE Course 1: Data Interpretation, Visualization, and Statistics for Nonclinical Toxicity Studies
- CE Course 2: Medical Device Safety Assessment: The Frontiers of Safety Assessment Pathology
- CE Course 3: Cardiac Effects Commonly Encountered in Drug Development: Mechanisms and Clinical Relevance
- CE Course 4: Otic Toxicologic Pathology

Our Society has been the beneficiary of numerous generous donations and efforts in creating several awards over the past few years and as a result this year we will have a separate business meeting and awards and recognition ceremony. In a change from previous years, the Annual Business Meeting is scheduled for Monday evening beginning at 5:30 pm and will be immediately followed by the annual Town Hall at 6:00 pm. The Town Hall topic this year is “If, When, and How to Undertake Blind Histopathologic Evaluation.” Plan to attend and share your experiences on this topic. The Awards and Recognition Ceremony is scheduled for Wednesday evening beginning at 5:30 pm and will be immediately followed by the President’s Reception at 7:00 pm. We hope you’ll plan to attend as we recognize and celebrate the accomplishments of some of our distinguished colleagues.

Each year the exhibitors add to the value and success of our meeting and I want to strongly encourage you to visit them. This year we are introducing a special incentive program for you to do so: "Scope it Out-Exhibitor QR Hunt" (see more on page 07 and check the meeting app). The Exhibit Hall is open on Sunday 5:00 pm–7:00 pm, coinciding with the Welcome Reception. It reopens on Monday 9:00 am–4:00 pm and then 9:00 am–1:00 pm on Tuesday and Wednesday. So, be sure to visit the exhibitors early in the week as the Exhibit Hall will be closed from Wednesday afternoon on.

Career development remains a paramount theme for the Society; sessions focusing on the topic include the Sunday morning Workshop on “Looking Forward: Cutting-Edge Technologies and Skills for Pathologists in the Future” and the Monday Lunchtime Series on “Global Perspective on Careers in Environmental Toxicologic Pathology.”

Special Interest Groups (SIGs) have become a vital component of our Society and at least 10 of them are meeting face-to-face during the Symposium. Check the meeting app or at Registration for meeting times and places if you are interested in learning more about these groups. There is no fee to join a SIG.

Tuesday afternoon is open to take advantage of the meeting location in downtown Raleigh, amidst the Southern charm of the City of Oaks. The Convention Center is in walking distance of world-class dining and sites like the North Carolina State House, the North Carolina Museum of Natural Sciences, and the North Carolina Museum of History. But don’t get too distracted with your afternoon off because you will want to attend the Environmental Histopathology Mystery Slide Session that evening, 7:30 pm–9:30 pm.

In closing, I look forward to meeting you during the week and at the President’s Reception immediately following the Awards and Recognition Ceremony on Wednesday evening. Enjoy the meeting and thank you for attending.

Sincerely,

Paul W. Snyder, DVM, PhD
President, Society of Toxicologic Pathology, 2018–2019
Executive Committee

STP President
Paul W. Snyder, DVM, PhD, DACVP, FIATP
EPL, Inc.

President-Elect
Kevin McDorman, DVM, PhD, DACVP
Charles River Laboratories

Secretary-Treasurer
Richard A. Peterson, II, DVM, PhD, DACVP
AbbVie

Past President
James D. Fikes, DVM, PhD, DABVT, DACVP
Biogen, Inc.

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Kathryn E. Gropp, DVM, PhD, DACVP (ASC Chair)
Pfizer, Inc.

Kathleen Heinz-Taheny, DVM, PhD, DACVP, DABT (ASC Co-Chair)
Eli Lilly & Company

Sandeep J. Akare, BVSc & AH, MVSc, PhD, DACVP, DABT
Alnylam

Basel T. Assaf, BVSc, PhD, DACVP (2020 Scientific Co-Chair; EdC Liaison)
Pfizer, Inc.

Marie-Odile Benoit-Biancamano, DVM, MSc, DACVP, DECVP (2021 Scientific Co-Chair)
University of Montreal

David Caudell, DVM, PhD (2020 Scientific Co-Chair)
Wake Forest University

Michelle C. Cora, DVM, DACVP (2020 Scientific Co-Chair)
NIEHS/NTP

Maria Lucia Dagli, DVM, MS, PhD
Universidade de Sao Paulo

Darlene Dixon, DVM, PhD, DACVP (CE Subcommittee)
NIEHS/NTP

Councilors

Stacey Fossey, DVM, PhD, DACVP, DABT
AbbVie

Mark J. Hoenerhoff, DVM, PhD, DACVP
University of Michigan Medical School

Karen S. Regan, DVM, DACVP, DABT
Regan Path/Tax Services

Jonathan Werner, DVM, PhD, DACVP
Amgen

Charles E. Wood, DVM, PhD, DACVP
Boehringer Ingelheim

2019 Scientific Program Committee

Deepta B. Rao, BVSc, MS, PhD, DABT, DACVP (2019 Scientific Co-Chair)
US FDA

Jack R. Harkema, DVM, PhD, DACVP (2019 Scientific Co-Chair)
Michigan State University

Jeffrey C. Wolf, DVM, DACVP (2019 Scientific Co-Chair)
EPL, Inc.

Mark F. Cesta, DVM, PhD, DACVP
NIEHS/NTP

Darlene Dixon, DVM, PhD, DACVP
NIEHS/NTP

Wanda M. Haschek-Hock, BVSc, PhD, DACVP, DABT, FIATP
University of Illinois

Ann Hubbs, DVM, PhD
NIOSH, CDC

Mac Law, DVM, PhD, DACVP
North Carolina State University

John C. Lipscomb, PhD, DABT, ATS
US EPA (retired)

Matt Martin, PhD
Pfizer, Inc.

Peter S. Spencer, PhD, FANA, FRCPath
Oregon Health & Science University

Charles E. Wood, DVM, PhD, DACVP (2019 SPPC EC Liaison)
Boehringer Ingelheim

2019 Continuing Education Subcommittee

Gopakumar Gopalakrishna, DVM, MS, DABT, DACVP (2019 CE Subcommittee Chair)
Supernus Pharmaceuticals

Katherine Hammerman, VMD, PhD, DACVP (2019 CE Subcommittee Co-Chair)
Pfizer, Inc.

Darlene Dixon, DVM, PhD, DACVP
NIEHS/NTP

Sarah H. Tannehill-Gregg, DVM, PhD, DACVP
Takeda Pharmaceuticals International Co.

Vimala Vemireddi, BVSc, MS, DACVP, DABT (Past CE Subcommittee Chair)
Covance Laboratories, Inc.

Charles E. Wood, DVM, PhD, DACVP (2019 SPPC EC Liaison)
Boehringer Ingelheim
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- Exhibitor Descriptions

#### Complimentary Wi-Fi Options
Complimentary Wi-Fi access is available in all areas within the Raleigh Convention Center. Complimentary guest room internet is provided for STP attendees who booked within the STP hotel blocks at the Marriott Raleigh City Center and Sheraton Raleigh Hotel.

### Get the App!

**2019 Annual Symposium Mobile App Quick Start Guide**

Select your name to access your profile and to manage your communications and privacy settings.

*Scroll down* to view additional icon buttons for each of the features and tools within the app.

**Use the universal search tool:**

**Schedule**—by Session or Event Title, Session or Event Type, Speakers

**Poster Abstracts**—by Title, Poster Number, Author Name or Affiliation, or Abstract Content

**Speakers**—by Name or Affiliation

**Exhibitors**—by Company Name or Booth Number

*The Search tool will search all content within the app.*

Download the STP 2019 mobile app from your app marketplace or view in your browser. [www.toxpath.org/am2019/app.asp](http://www.toxpath.org/am2019/app.asp)

**Complimentary Wi-Fi Options**
Complimentary Wi-Fi access is available in all areas within the Raleigh Convention Center. Complimentary guest room internet is provided for STP attendees who booked within the STP hotel blocks at the Marriott Raleigh City Center and Sheraton Raleigh Hotel.

Meeting materials can also be viewed online: [www.toxpath.org/am2019/materials.asp](http://www.toxpath.org/am2019/materials.asp). You will be prompted for a login. Members can access with normal STP login. Other attendees can access with login provided via email.
Awards

2019 STP Lifetime Achievement Award

Peter C. Mann, DVM, DACVP, FIATP

The Society of Toxicologic Pathology is pleased to recognize Peter Mann as the 2019 STP Lifetime Achievement Awardee on the basis of his achievements in the areas of education and regulatory standards as well as his distinguished service to the Society of Toxicologic Pathology. Dr. Mann received an AB degree in English from Washington University in St. Louis, MO, and a DVM degree from the University of Missouri in Columbia, MO. He completed his residency in veterinary pathology at the National Zoological Park in Washington, DC. He began his career in toxicologic pathology at Stuart Pharmaceuticals (now AstraZeneca). For the past 30 years, he has worked as a veterinary pathologist for Experimental Pathology Laboratories, Inc. (EPL®) where he has held numerous positions from Director to Senior Projects Manager to On-Site Consultant. For the majority of the past two decades, he has been providing veterinary pathology expertise as a manager and off-site pathologist with a major emphasis in peer reviews and pathology working groups.

A nationally and internationally recognized leader in the area of peer review and pathology working groups, Dr. Mann has had multiple leadership roles in the INHAND initiative, including two appointments as Chair of the Global Editorial Steering Committee. He has numerous publications and is considered by his peers to be an expert on utilization of the transgenic rash2 and p53 heterozygous mouse in preclinical carcinogenicity assays.

Dr. Mann has served as STP President as well as a member of the Executive Committee, Chair of the 1998 Scientific Program Committee, member of the STP Annual Symposium Committee, and Co-Chair of the Education Committee. For his contributions and achievements in his exemplary service to STP as well as for serving as a role model for veterinary and toxicologic pathologists around the world, the Society proudly presents Dr. Mann with the 2019 STP Lifetime Achievement Award.

2019 STP Distinguished Early Career Award

Chidozie J. Amuzie, DVM, PhD, DACVP, DABT

The Society of Toxicologic Pathology recognizes Chidozie “Dozie” Amuzie as the 2019 STP Distinguished Early Career Awardee. Dr. Amuzie received his DVM from the University of Nigeria, Nsukka, in 2004, and his PhD as a Dual Major in Comparative Medicine and Integrative Toxicological Sciences from Michigan State University, East Lansing, in 2009. Since his training at MSU, where he was an outstanding graduate student and resident who excelled in all aspects of his training, Dozie has had significant leadership positions as an industrial toxicologic pathologist managing teams of pathologists first at MPI Research (2015–2016, Associate Director of Pathology and Drug Safety) and now at Janssen R&D (2016–present, Scientific Director of Pathology, Preclinical Development and Safety). He has made significant contributions to Toxicologic Pathology that includes his current efforts at Janssen to use animal models to understand the pathobiology and advance safe therapeutics for treating autoimmune diseases such as rheumatoid arthritis. In addition, he has led innovative groups in the STP to 1) integrate the latest advances of the pathobiology of the immune system in safety assessment, 2) characterize and publish a novel translational minipig model for the study of atherosclerosis, 3) foster international education of toxicologic pathologists as STP International Education Committee Chair, and 4) initiate the institution of an SOT(TEPSS)/STP student travel award benefitting trainees and fostering scientific interaction of SOT and STP members. Among several awards, Dr. Amuzie was the inaugural recipient of the STP Global Scholar Award in 2018. He has authored 17 peer-reviewed journal articles and five book chapters to date—with many more to come. For all that he has accomplished in his early career, STP is proud to honor Dozie Amuzie as the 2019 Distinguished Early Career Awardee.

2019 STP Outstanding Mentor Award

Aaron M. Sargeant, DVM, PhD, DACVP

The Society of Toxicologic Pathology recognizes Aaron Sargeant as the 2019 Outstanding Mentor Awardee. Dr. Sargeant received his DVM from The Ohio State University (OSU) in 2004, completing both his residency in veterinary anatomic pathology and PhD in experimental pathology in 2009, also from OSU. Dr. Sargeant is currently Scientific Director, Pathology, at Charles River Laboratories (CRL), Spencerville, Ohio, since 2016. He began his career at Battelle Memorial Institute, Columbus, Ohio, working part-time in Pathology during veterinary and graduate training (2001–2004, 2006–2008). Employment at CRL began as Veterinary Pathologist II (2009–2015) then as Senior Veterinary Pathologist (2015–2016). As coordinator of global Charles River Externships in the CRL Toxicologic Pathology program, Dr. Sargeant serves as the initial point of contact for externship inquiries across CRL sites, matching student interests with site availability. Nineteen students have completed externships at the Spencerville site alone since he first implemented the externship program there in 2011. Aaron also serves as an adjunct instructor in Biological Sciences at Ohio Northern University, Ada, Ohio, since 2010. Dr. Sargeant joined the STP as a student in 2002, and since 2009 has served on multiple committees as a member, co-chair, and chair. He is currently a member of the Scientific and Regulatory Policy Committee. Most recently, he has served as Chair, ACVP/STP Coalition Board of Governors (2017–2018) following a year as a member; Chair, Career Development and Outreach Committee (2013–2015), following two years as co-chair; Co-Chair, Scientific Session 1, Toxicologic Pathology of the Skin, 2015 Combined ACVP/ASVCP/STP Meeting; and Chair, Poster Committee/Annual Symposium Committee (2013–2015), following four years as a member. A frequently published author, Aaron has published more than 200 research articles and three book chapters and serves as a reviewer for Toxicologic Pathology. He is an active member of his community as Vice President, Board of Health for the local health district and member of the local hospital Foundation Board.

04 | Awards

Download the 2019 Annual Meeting App for up-to-date information.
2019 STP Student Travel Awards

Lori Bedient  
Washington State University

Anna Gates  
Michigan State University

Sophie Nelissen  
Janssen Pharmaceuticals

Nicholas Vetter  
Michigan State University

Josephine Brown  
University of Cincinnati

Emily Mackey  
North Carolina State University

Hannah Ruetten  
University of Wisconsin-Madison

Kyle Wegner  
University of Wisconsin-Madison

Sarah Coe  
Michigan State University

Michelle Magagna  
Michigan State University

James Tarrant  
University of Pennsylvania

Agnes Wong  
Purdue University

Alix Dieterly  
Purdue University

Michael Martinez  
The Ohio State University

Priyanka Thakur  
Wake Forest School of Medicine

Laine Feller  
Cornell University

Nicholas Vetter  
Michigan State University

2019 STP Young Investigator Awards

Winners will be announced at the Awards and Recognition Ceremony at 5:30 pm on Wednesday, June 26, in Ballroom A. (See page 18 for judging times.)

2019 STP Environmental Toxicologic Pathology SIG Student Research Award

Emily Mackey, North Carolina State University
P009: “Perinatal Di-(2-ethylhexyl) Phthalate Exacerbates Anaphylaxis in Male Offspring”

2019 STP/ACVP Student Poster Award

Byunghak Kang, Johns Hopkins University
P013: “Aging-Like Spontaneous Epigenetic Silencing Facilitates WNT Activation, Stemness, and BRFV600E-Induced Tumorigenesis”

2019 STP/TEPSS Student Award

Alexa Murray, Rutgers University
“Regulation of Macrophage Phenotype by Farnesoid X Receptor during Nitrogen Mustard-Induced Lung Injury”

2019 IATP/STP Charles Capen Trainee Award

Vanessa Vrolyk, University of Montreal

2019 IATP/STP Food Safety Scientific Award

Mimi Huang, NIEHS/NTP
P018: “Effects of Black Cohosh Root Extract on Reproduction and Development of Male and Female Hsd: Sprague-Dawley SD Rats”

2019 IATP/STP Toxicologic Pathology Trainee Award

Alix Dieterly, Purdue University
P015: “A Time-Course Analysis of Blood-Tumor Barrier Pathology in Brain Metastasis”

Toxicologic Pathology Best Paper Awards

Best Paper Award for Original Manuscript

Performance Assessment of New Urinary Translational Safety Biomarkers of Drug-Induced Renal Tubular Injury in Tenofovir-treated Cynomolgus Monkeys and Beagle Dogs


Best Paper Award for Invited Review/Review

Bone Toolbox: Biomarkers, Imaging Tools, Biomechanics, and Histomorphometry


Aurore Varela and Jacquelin Jolette.
**Meeting Events**

**Welcome Reception**  
Sunday, June 23, 5:30 PM–7:00 PM  
Ballroom B  
The STP Welcome Reception will kick off the week in the Exhibit Hall for all registered meeting attendees. Please wear your badge and bring your Welcome Reception ticket. (Your Welcome Reception ticket will also serve as your drink ticket; it was distributed with your badge). Tickets for guests 18 years of age or older* accompanying a registered attendee may be purchased for $30 (USD) at the registration desk.  

*To ensure their safety, children under the age of 18 are not permitted in the Exhibit Hall.

**Student/Mentor Mixer**  
Sponsored by EPL, Inc.  
Sunday, June 23, 7:00 PM–8:30 PM  
The Raleigh Times (Off-Site Venue)  
For all students and invited mentors. Refreshments will be provided.

**Annual Business Meeting and Town Hall**  
Monday, June 24, 5:30 PM–7:00 PM  
Ballroom A  
The Town Hall will begin around 6:00 PM, immediately following the Annual Business Meeting.

**Student Outing**  
Sponsored by EPL, Inc.  
Tuesday, June 25, 1:30 PM–4:00 PM  
Room 402  
The STP Student Outing will be teaming up with Operation City Quest to engage in some friendly competition as we go head to head on a Scavenger Hunt adventure through downtown Raleigh. The event will end at a restaurant.

**Awards and Recognition Ceremony**  
Wednesday, June 26, 5:30 PM–6:30 PM  
Ballroom A  
STP award recipients will be recognized at this time. The President’s Reception will begin immediately following the Awards and Recognition Ceremony.

**President’s Reception**  
Sponsored, in part, by a generous grant from EPL, Inc.  
Wednesday, June 26, 7:00 PM–9:00 PM  
Ballroom B  
One ticket to this event is provided to all meeting registrants. Please wear your badge and bring your President’s Reception ticket that was provided with your badge. Drink tickets will be distributed at the door. Additional tickets can be purchased on-site for $65. (For children of attendees 11–17 years old: $35). Attendees with children under 11 years of age are permitted to attend the President’s Reception at no charge as long as the child is under the supervision of the parent at all times.

**Complimentary Wi-Fi Options**

Complimentary Wi-Fi access is available in all areas within the Raleigh Convention Center. Complimentary guest room internet is provided for STP attendees who booked within the STP hotel blocks at the Marriott Raleigh City Center and Sheraton Raleigh Hotel.

**Registration Information**

**Registration Lobby**  
Friday, June 21 ......................................................... 4:00 PM–6:00 PM  
Saturday, June 22 ...................................................... 8:00 AM–6:00 PM  
Sunday, June 23 ......................................................... 7:00 AM–6:00 PM  
Monday, June 24 ....................................................... 7:00 AM–5:30 PM  
Tuesday, June 25 ....................................................... 7:00 AM–1:00 PM  
Wednesday, June 26 ................................................... 7:30 AM–5:30 PM  
Thursday, June 27 ....................................................... 7:30 AM–12:00 Noon

**Registration Materials**  
Badges, Program, event tickets, and ribbons (if appropriate), will be available for pickup at the Registration Desk (see registration hours above). Attendees are encouraged to bring a bag or backpack as there is a limited quantity of meeting bags available.

**Meeting Materials/Mobile App**  
Meeting publications, handouts, attendee list, committee and ancillary meetings schedule, and evaluation forms will be posted on the Annual Meeting’s “Meeting Materials” webpage when available. STP members will use their regular login to access this page. Nonmember attendees will receive a login and password via email to access the website. Attendees are also encouraged to download the STP 2019 Mobile App from the Apple or Android stores, www.toxpath.org/am2019/app.asp.

**Symposium Registration**  
Member, Nonmember, and Student full meeting registration fees include the symposium proceedings, access to scientific sessions, Exhibit Hall, morning and afternoon breaks during the scientific sessions, and admission for one to the Welcome Reception and President’s Reception.

**Guest Registration**  
The Guest registration fee includes one admission to the Welcome Reception (Sunday) and the President’s Reception (Wednesday).

**Speaker Ready Room**

**Business Office**  
Saturday, June 22 ...................................................... 12:00 Noon–5:00 PM  
Sunday, June 23 ......................................................... 7:00 AM–5:00 PM  
Monday, June 24 ....................................................... 7:00 AM–5:30 PM  
Tuesday, June 25 ....................................................... 7:00 AM–12:00 Noon  
Wednesday, June 26 ................................................... 7:00 AM–5:00 PM  
Thursday, June 27 ....................................................... 7:00 AM–11:00 AM
General Information

Exhibit Hall

Ballroom B

The Exhibit Hall will be a center of activity during this year’s Symposium, kicking off with a Welcome Reception in the Exhibit Hall on Sunday evening, June 23.

Morning and afternoon refreshment breaks will be held in the hall throughout the week unless otherwise noted. Scientific poster sessions will also be held Sunday evening through Wednesday in the Exhibit Hall.

The Society values the support of exhibitors and believes the relationship between exhibiting companies and the STP membership is a mutually beneficial one. For exhibitor setup, exhibit hall, and exhibitor teardown times, see page 24.

Exhibit Hall Policies

Large packages and bags are not permitted in the Exhibit Hall area.

Out of courtesy for the scientific presenters and exhibitors, we appreciate your compliance with the following polices:

Photography Policy

• Photography of poster presentations is prohibited without the specific consent of the presenter(s)/author(s). All photography is prohibited in scientific sessions.

• Photography of exhibitor booths and/or equipment is prohibited without the specific consent of the exhibitor.

Children Under 18 Years of Age

• To ensure their safety, children under the age of 18 are not permitted in the Exhibit Hall at any time including during the Exhibit hours, Welcome Reception, and Poster Sessions.

Scope it Out—Exhibitor QR Hunt

This year we are introducing a special incentive program for all attendees. Visit the Exhibit Hall and Scope Out the QR codes to win big! Visit 5 exhibitor booths and scan their Scope it Out QR codes to receive a $15 Starbucks gift card! Visit 10 or more booths to be entered in a prize drawing for $100, $150, and $250. Check out the Scope it Out section in the mobile app to join the Hunt! Visit the STP Registration Desk to claim your Starbucks gift card. Winners of the cash prizes will be announced at the Awards and Recognition Ceremony.

Safety and Security Tips

Here are a few quick tips for your safety and security—for more tips, please see the mobile app:

• Be sure to wear your name badge while in the conference venue. For security purposes, it is recommended to remove your badge outside the conference venue and keep in a secure place. If you lose your badge, please go to the Registration Desk for assistance.

• Walk in well-lighted areas preferably with a group. Never walk alone.

• Do not leave bags or items unsecured in any meeting room, display, or other area. If you see any suspicious articles, packages, persons, or activity, please contact the event staff or security immediately.

• For further tips, including responding to protesting of any kind, please see the mobile app for details. Always contact event staff or security rather than engage a protester.

Announcing Updates to STP Bylaws, Ethics Policy and Whistleblower Policy, and a new Non-Discrimination and Anti-Harassment Policy

STP President, Paul W. Snyder, would like to advise all STP members of an update to the STP Bylaws as approved by the STP Executive Committee, as follows:

“The STP is committed to the philosophy of equality of opportunity and treatment for all, regardless of gender, gender identity, race, ethnic origin, religion, age, marital status, sexual orientation, disabilities or any other reason unrelated to scientific merit. The STP Executive Committee shall be responsible for the development of such policies as may be appropriate to recognize and maintain this commitment.”

Pursuant to this and with legal guidance and extensive review by the Executive Committee, the STP Executive Committee has approved updates to both the STP Ethics Policy and Whistleblower Policy and has introduced a new Non-Discrimination and Anti-Harassment Policy. Please go to www.toxpath.org for more information on these important updated and new policies.

Dr. Snyder will announce these policies at the Annual Business Meeting of the Society held during the STP 38th Annual Symposium in Raleigh, NC, on Monday, June 24, at 5:30 pm and invites all to attend. The Business Meeting will be immediately followed by the Town Hall.

To anonymously report suspected criminal activity or illegal or unethical conduct by an STP member, management staff, or participant in any STP activity or STP business relationship, call the Navex toll-free fraud hotline at 800-826-6762.

SPECIAL MEMBERSHIP OFFER: Nonmembers who apply for membership prior to July 1 and who are accepted will receive complimentary membership for the remainder of 2019 and the online journal issues for the remainder of the year. Please visit www.toxpath.org to apply for membership.
Raleigh Convention Center Map

Main Level (300 Level)

- Committee Meeting Rooms
- CE Courses
- Career Development Sessions (Sun and Mon)
- IATP/STP Maropot Guest Lecture Series
- Speaker Ready Room

Ballroom Level (400)

- Welcome Reception
- President’s Reception
- NTP Satellite Symposium
- Scientific Sessions
- Annual Business Meeting and Town Hall
- Awards and Recognition Ceremony

Download the 2019 Annual Meeting App for up-to-date information.
STP Modular Education Course

Toxicologic Pathology of Special Senses

October 20–23, 2019

Hilton Indianapolis Hotel & Suites • Indianapolis, Indiana

Register Today!

Agenda

• Challenging real-world ocular and otic pathology examples from multiple preclinical species
• Review of INHAND special senses nomenclature
• Xenobiotic induced ocular and otic pathology and toxicity with review of innovative technologies
• Comparative anatomy of eye and ear of relevant laboratory species
• Comprehensive review of clinical data and association with histopathologic changes
• Microscopy sessions on non-neoplastic and neoplastic ocular and otic pathology examples
• Comparative anatomy of nasal and tongue histopathology
• Neuropathology of special senses
• Regulatory guidelines and considerations for ocular and otic studies

Call for Case Studies

• Discussion of ocular and otic histopathology examples submitted in advance by you!

On behalf of STP Education Committee

Course Co-Chairs: Tracy Carlson (Charles River); Helen Booher (Genentech); Alok Sharma (Covance);
Course Scientific Advisors: Ken Schafer (StageBio); Bradley Njaa (Kansas State University)

*Topics subject to change.

Visit www.toxpath.org to register and for more information.

2019 Annual Symposium Mobile App

Download the app (STP 2019) from your app marketplace or access the Annual Symposium App at www.toxpath.org/am2019/app.asp

This interactive app will allow you to:

• Access meeting materials at your fingertips!
• View the schedule and sessions, save sessions to your personal agenda, and get detailed presenter information.
• Stay up to date on the most popular sessions, promotions, and events in the Activity Feed.
• Take part in our new Scope it Out-Exhibitor QR Hunt challenge and win prizes!
• Earn points by completing CE and Session evaluations, featured polls, and the post meeting survey in the App.
• Receive announcements and obtain the most up-to-date information about what’s going on.
• Expand your professional network and have fun by interacting with other attendees in the App.

SURVEYS & POLLS!

Complete CE and Session evaluations, featured polls, and the post meeting survey in the App!
Attendees will receive a push notification alert at the appropriate time.

Image Credits:
Eye Image/Alok Sharma and Ear Image/Tracy Carlson
SATURDAY, JUNE 22

NTP Satellite Symposium: Pathology Potpourri

9:00 AM–4:30 PM
Ballroom A

Refreshments sponsored by Charles River, EPL, Inc. and Integrated Laboratory Systems

Chair: Susan A. Elmore, MS, DVM, DABT, FIATP, DACVP, NIEHS/NTP, Research Triangle Park, NC

The objective of this interactive symposium is to provide continuing education on interpreting pathology slides, to generate lively and productive conversation, and to have a good time. During each talk, the speakers will project a series of images of lesions on one screen with a choice of diagnoses/answers on a separate screen. The members of the audience will then vote using wireless keypads and the results will be displayed on the screen. Time is allowed for discussion after each voting session.

9:00 AM–9:10 AM
Welcome and Introductory Remarks
Susan A. Elmore, MS, DVM, DABT, DACVP, FIATP, NIEHS/NTP, Research Triangle Park, NC

9:10 AM–9:40 AM
Aging Mouse Fun
Erin Quist, DVM, MS, PhD, DACVP, EPL, Inc., Research Triangle Park, NC; Torrie A. Crabbs, DVM, DACVP, EPL, Inc., Research Triangle Park; and Debabrata Mahapatra, DVM, MS, PhD, DACVP, Integrated Laboratory Systems, Inc., Research Triangle Park, NC

9:40 AM–10:05 AM
It’s a Phthalate “Phthing”
Mark Cesta, DVM, PhD, DACVP, NIEHS/NTP, Research Triangle Park, NC

10:05 AM–10:30 AM
Ovarian Lesion in a Young Sprague-Dawley Rat
Haoan Wang, BVM, MS, DCCVP, West China Hospital of Sichuan University/West China-Frontier Pharma Tech Co., Ltd. (WCFP), Chengdu, Sichuan, China

10:30 AM–11:00 AM
Break

11:00 AM–11:20 AM
A Perioptic Predicament
Gregory A. Krane, DVM, DACVP, NIEHS/NTP, Research Triangle Park, NC

11:20 AM–11:40 AM
Unusual Lesions in the Pancreas and Liver of Harlan Sprague-Dawley Rats
Torrie A. Crabbs, DVM, DACVP, EPL, Inc., Research Triangle Park, NC

11:40 AM–12:00 Noon
Are Too Many Eggs a Risk for the Dog?
Matthias Rinke, Retired, DVM, PhD, FIATP, Wüelfrath, Germany

12:00 Noon–1:30 PM
Lunch on Your Own

1:30 PM–1:50 PM
Discommodious Distalis
Cynthia J. Willson, MS, PhD, DVM, DACVP, Integrated Laboratory Systems, Inc., Research Triangle Park, NC

1:50 PM–2:10 PM
A Blood Smear Dilemma
Gregory S. Travlos, DVM, DACVP, NIEHS/NTP, Research Triangle Park, NC

2:10 PM–2:30 PM
Beyond the Spectrum of Chronic Progressive Nephropathy
Erin M. Quist, DVM, MS, PhD, DACVP, EPL, Inc., Research Triangle Park, NC

2:30 PM–3:00 PM
Granularity Matters from the Diagnosis of Neoplasms
Kyathanahalli Janardhan, BVSc, MVSc, PhD, DACVP, Integrated Laboratory Systems, Inc., Research Triangle Park, NC

3:00 PM–3:30 PM
Break

3:30 PM–4:00 PM
I See a Strange Confession in Thine Eye
George W. Schaaf, DVM, Wake Forest School of Medicine, Winston-Salem, NC

4:00 PM–4:30 PM
Challenging Cases from the Fish INHAND Group
Jeffrey C. Wolf, DVM, DACVP, EPL, Inc., Sterling, VA

7:00 PM–10:00 PM
Sponsored Reception: Co-sponsored by Charles River and Visiopharm
Marriott Raleigh City Center, State Ballroom B

SUNDAY, JUNE 23

Career Development Workshop

8:00 AM–12:00 Noon
Room 301
Sponsored by EPL, Inc.

Looking Forward: Cutting-Edge Technologies and Skills for Pathologists in the Future

Co-Chairs: Kyathanahalli Janardhan, BVSc, MVSc, PhD, DACVP, Integrated Laboratory Systems, Research Triangle Park, NC; and Rebecca Kohnken, DVM, PhD, DACVP, AbbVie, North Chicago, IL

Toxicologic pathology is one of the most valuable fields contributing to the advancement of animal and human health. With the ever-changing technological and economic environment, the basic skill set pathologists are equipped with may require refinement to address the current and future needs. Periodically, pathologists must add relevant, new skills to their...
### Toolbox. This session provides a comprehensive review of some of the skills that will be handy for the current time and the near future.

**8:00 AM – 8:05 AM**  
**Welcome and Introduction**

**8:05 AM – 8:45 AM**  
**Artificial Intelligence—Pathologist’s Friend or Enemy?**  
Oliver C. Turner, BSc (Hons), BVSc, MRCVS, PhD, DACVP, DABT, Novartis Institutes for Biomedical Research, East Hanover, NJ

**8:45 AM – 9:30 AM**  
**Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) Technology**  
Channabasavaiah B. Gurumurthy, MVSc, PhD, Exec MBA, University of Nebraska Medical Center, Omaha, NE

**9:30 AM – 10:00 AM**  
**Break**

**10:00 AM – 10:45 AM**  
**MicroRNA Therapies**  
Rebecca Kohnken, DVM, PhD, DACVP, AbbVie, North Chicago, IL

**10:45 AM – 11:30 AM**  
**Next Generation Sequencing (NGS)**  
Ramesh C. Kovi, BVSc & AH, MVSc, PhD, DACVP, DABT, EPL, Inc., Research Triangle Park, NC

**11:30 AM – 12:00 Noon**  
**Panel Discussion**

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### CE1 (Sunday AM)

**8:00 AM – 12:00 Noon**  
**Room 305**

**Data Interpretation, Visualization, and Statistics for Nonclinical Toxicity Studies**

**Co-Chairs:** Michael Logan, DVM, PhD, DACVP, AbbVie, Highland Park, IL; and Susan G. Emaleigh Hart, VMD, PhD, DACVP, DABT, ERT, VenatoRx Pharmaceuticals Inc., Malvern, PA

Analysis of anatomic and clinical pathology data is central to the safety assessment of new molecules. Technologic advancement and the push for additional measures for both toxicity and risk prediction have expanded the pathologist’s toolbox for data presentation and analysis. This course will explore the application of new data visualization tools and their application to toxicologic pathology with examples that are applicable to both anatomic and clinical pathology. In addition, the more traditional statistical analysis tools for data analysis will be scrutinized. The appropriate (and sometimes inappropriate) use of these techniques will be presented in a user friendly and toxicologic pathology focused manner.

**8:00 AM – 8:40 AM**  
**Introduction to Data Visualization Technology—Evolution, Functionality, Data Requirements, Pitfalls, and Regulatory Considerations**  
Sean Troth, DVM, PhD, DACVP, Merc & Co., Inc., West Point, PA

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**8:40 AM – 9:15 AM**  
**Data Visualization; Practical Applications**  
Brian Knight, DVM, PhD, Boehringer Ingelheim Pharmaceuticals Inc., Ridgefield, CT

**9:15 AM – 9:45 AM**  
**Data Visualization Strategies and Limitations for Clinical Pathology Endpoints**  
Bill Siska, DVM, MS, DACVP, Charles River Laboratories, Reno, NV

**9:45 AM – 10:15 AM**  
**Break**

**10:15 AM – 10:50 AM**  
**Statistical Methods, an Overview of Their Application to Anatomic and Clinical Pathology Data from Toxicologic Pathology Studies**  
Lila Ramaiah, DVM, PhD, DACVP, Bristol-Myers Squibb, New Brunswick, NJ

**10:50 AM – 11:25 AM**  
**Practical Limitations of Statistical Analysis of Clinical Pathology Data from Toxicologic Pathology Studies**  
Kirstin Barnhart, DVM, PhD, DACVP, Alice, TX

**11:25 AM – 12:00 Noon**  
**Statistical Applications in Biomarker Development and How Not to Torture Data**  
Jacqueline Tarrant, BVSc, PhD, DACVP, Gilead Sciences, Foster City, CA

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### CE2 (Sunday AM)

**8:00 AM – 12:00 Noon**  
**Room 306**

**Medical Device Safety Assessment: The Frontiers of Safety Assessment Pathology**

**Co-Chairs:** Maureen T. O’Brien, DVM, MS, DACVP, Charles River Laboratories, Frederick, MD; and Serge D. Rousselle, DVM, DACVP, Alizée Pathology, Thurmont, MD

Pathology of medical devices poses unique, ever-evolving challenges and considerations that often cannot be answered by employing traditional toxicologic pathology methods. Furthermore, medical device specimens may be limited and/or expensive; therefore, having a structured approach to pathology is particularly essential for study success. Medical device regulation differs from that of drugs, and knowledge of the regulatory pathways is an asset when providing pathologic evaluation of medical devices. This course provides an introduction to basic medical device pathology, including specialized methods for pathology such as plastic embedding, unique considerations for the regulatory path to market for medical devices.

**8:00 AM – 9:00 AM**  
**Basic Techniques in Medical Device Pathology**  
Nicolette D. Jackson, DVM, DACVP, AccelLab, Boisbriand, Québec, Canada
9:00 AM–9:30 AM  
Overview of the Regulatory Approval Process for Medical Devices in the United States  
Karen Manhart, VMD, MA, DACVP, US FDA, CDRH, Laurel, MD

9:30 AM–10:00 AM  
Break

10:00 AM–10:30 AM  
Biocompatibility: Key Concepts for Medical Device Safety Assessment  
William C. Stoffregen, DVM, PhD, DACVP, Northstar Preclinical and Pathology Services, LLC, Lake Elmo, MN

10:30 AM–11:00 AM  
A Primer of Common Medical Device Biomaterials  
Lyn M. Wancket, DVM, PhD, DACVP, Charles River Laboratories, Raleigh, NC

11:00 AM–11:30 AM  
Medical Device Bioabsorption  
Serge D. Rousselle, DVM, DACVP, Alizée Pathology, Thurmont, MD

11:30 AM–12:00 Noon  
Hernia Mesh Implants  
John H. Keating, DVM, DACVP, CBSET, Inc., Lexington, MA

CE3 (Sunday PM)  
1:30 PM–5:30 PM  
Room 305

Cardiac Effects Commonly Encountered in Drug Development: Mechanisms and Clinical Relevance  
Sponsored by the American College of Toxicology (ACT)  
Co-Chairs: Matthew M. Abernathy, PhD, DSP, Eli Lilly & Company, Indianapolis, IN; and Donald N. Jensen, DVM, MS, US FDA/CDER, Silver Spring, MD

The cardiovascular system is an intricate meshwork of organ structures regulated by multiple feedback loops to maintain organ perfusion, deliver fuel, and remove cellular waste. Due to the range of CV targets that are dispersed throughout our many tissues, it should be of no surprise that a high percentage of drug attrition falls at the feet of cardiovascular findings both preclinically and clinically. Given the high exposures achieved and techniques used to assess CV safety in preclinical models, the number of preclinical observations of CV effects generally exceeds the prevalence of effects observed clinically. Findings may range from cardiomyopathy to arrhythmia, and not all CV safety signals carry the same weight when deciding to continue to develop a compound. Thus, safety margin and target patient population heavily influence judgment-based development decisions beginning early on in compound discovery. This course will focus on mechanisms for both histological and functional cardiac effects encountered during drug development. Additionally, decision-making strategies for unexpected CV effects and use of in silico models to predict the mechanism and translation of cardiac effects to the clinic will be covered in depth.

1:30 PM–2:10 PM  
Cardiac Toxicity: Options from a Regulatory Perspective  
Donald N. Jensen, DVM, MS, US FDA/CDER, Silver Spring, MD

2:10 PM–2:50 PM  
Integrative Cardiovascular Toxicologic Pathology—Building Translational Bridges  
Brian Berridge, DVM, PhD, DACVP, NIEHS/NTP, Research Triangle Park, NC

2:50 PM–3:20 PM  
Break

3:20 PM–4:00 PM  
Measuring, Interpreting, and Decision Making Based on Drug-Induced Hemodynamic Effects, Case Studies in Diabetes and Oncology  
Matthew M. Abernathy, PhD, DSP, Eli Lilly & Company, Indianapolis, IN

4:00 PM–4:40 PM  
Safe QTc Prolongation? How the Comprehensive In Vitro Proarrhythmia Assessment Will Spare Nontorsadogenic Molecules that Prolong Cardiac Repolarization (QTc Interval)  
Wendy Wu, PhD, US FDA/CDER, Silver Spring, MD

4:40 PM–5:20 PM  
In Silico Modeling in Cardiorenal Safety Assessment  
K. Melissa Hallow, PhD, University of Georgia, Athens, GA

5:20 PM–5:30 PM  
Panel Discussion

CE4 (Sunday PM)  
1:30 PM–5:30 PM  
Room 306

Otic Toxicologic Pathology  
Co-Chairs: Kenneth A. Schafer, DVM, PhD, DACVP, StageBio, Greenfield, IN; and Bradley L. Njaa, BSc (Hons), DVM, MVSc, DACVP, Kansas State University, Manhattan, KS

The ear is infrequently evaluated in toxicologic pathology, and only so when there are very specific drivers to evaluate it. These include known compound classes where otic toxicity may be anticipated or when the intended therapeutic is applied directly to the ear. This session will cover an overview of otic anatomy, otic physiology, techniques in otic toxicology, otic pathology, and regulatory considerations for otic toxicology studies.

1:30 PM–2:15 PM  
Comparative Anatomy and Physiology of the External and Middle Ear  
Bradley L. Njaa, BSc (Hons), DVM, MVSc, DACVP, Kansas State University, Manhattan, KS

2:15 PM–2:40 PM  
Anatomy and Physiology of Hearing and Balance  
Teresa Southard, DVM, PhD, DACVP, Cornell University, Ithaca, NY
2:40 PM–3:35 PM
Nonclinical In-Life Study Requirements to Assess Ototoxicity
Rachel Tapp, MS, Charles River Laboratories, Mattawan, MI

3:35 PM–4:05 PM
Break

4:05 PM–4:50 PM
Otic Toxicologic Pathology
Kenneth A. Schafer, DVM, PhD, DACVP, StageBio, Greenfield, IN

4:50 PM–5:30 PM
Regulatory Considerations for Otic Toxicology Studies
Christopher Toscano, PhD, DABT, US FDA, CDER, Silver Spring, MD

5:30 PM–7:00 PM
Welcome Reception
Ballroom B

7:00 PM–8:30 PM
Student/Mentor Mixer
The Raleigh Times (off-site venue)
All Students and Invited Mentors. Sponsored by EPL, Inc.

Session 1

9:00 AM–12:00 Noon
Ballroom A

Toxicology and Pathology of Air Pollution
Co-Chairs: Jack R. Harkema, DVM, PhD, DACVP, ATSF, Michigan State University, East Lansing, MI; and Mark Cesta, DVM, PhD, DACVP, NIEHS/NTP, Research Triangle Park, NC

Nine out of ten people in the world live in areas with polluted air according to the World Health Organization. Seven million people each year die as a result of diseases caused by exposures to outdoor or indoor air pollution. Toxicological and pathobiological research has been instrumental in providing biological plausibility and paradigms for the association of adverse health effects and air pollutant exposure identified by environmental epidemiologists. The speakers in this session will provide presentations on cutting-edge research that focuses on the toxicology and pathobiology of air pollutants (e.g., fine particulate matter, ozone) that emanate from various sources ranging from motor vehicle traffic to wildfires. They will present recent discoveries that have uncovered possible ways that short- or long-term exposures to specific toxic components in polluted air may directly or indirectly foster the development of or exacerbate a wide-range of respiratory, cardiovascular, metabolic, autoimmune and neurological diseases. Research to identify why certain sub-populations (e.g., children, the elderly, diabetics) appear more susceptible to the health effects of air pollution, as well as studies to identify effective interventions to prevent or treat air-pollutant-triggered illnesses will also be presented. The session will foster discussions on data gaps and future research that are needed to address this global environmental health problem.

MONDAY, JUNE 24

Symposium Welcome and Keynote Address
8:00 AM–9:00 AM
Ballroom A

8:00 AM-8:10 AM
Symposium Welcome

8:10 AM-9:00 AM
Keynote Address: The National Institute of Environmental Health Sciences: Protecting Public Health, from Ecosystems to Communities
Linda S. Birnbaum, PhD, DABT, ATS, NIEHS/NTP, Research Triangle Park, NC

9:00 AM–9:10 AM
Introduction to Topic and Speakers
Mark Cesta, DVM, PhD, DACVP, ATSF, Michigan State University, East Lansing, MI; and

9:10 AM–9:45 AM
Cardiopulmonary Health Effects of Air Pollution
Kent E. Pinkerton, PhD, University of California Davis, Davis, CA

9:45 AM–10:20 AM
Susceptibility Variations in Air Pollution Health Effects
Urmila P. Kodavanti, PhD, DABT, US EPA, Research Triangle Park, NC
10:00 AM–10:50 AM

**Break: Exhibits and Poster Sessions**

10:50 AM–11:25 AM

**Exposure to Ambient Ultrafine Particles as a Risk Factor for Neurodevelopmental Disorders**  
*Deborah A. Cory-Slechta, PhD, University of Rochester School of Medicine, Rochester, NY*

11:25 AM–12:00 PM

**New Onset Asthma, Ozone, and Innate Lymphoid Cells: A New Pathogenesis Paradigm**  
*Jack R. Harkema, DVM, PhD, DACVP, ATSF, Michigan State University, East Lansing, MI*

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**Career Development Lunchtime Series**

12:30 PM–1:30 PM  
**Room 301**  
**Sponsored by EPL, Inc.**

**Global Perspective on Careers in Environmental Toxicologic Pathology**  
*Chair: Wanda Haschek-Hock, BVSc, PhD, DACVP, DABT, FIATP, University of Illinois, Urbana, IL*

A wide range of career options are available globally in the environmental toxicologic pathology (ETP) arena including academia, government, contract research organizations and the agrichemical industry. This small and specialized subset of toxicologic pathologists addresses the effects of contaminants and pollutants on human, animal and ecological health (One Health). Veterinary students and pathology trainees are primarily exposed to diagnostic pathology and often have limited exposure to toxicologic pathology and even less so to the issues and opportunities in environmental toxicology. The speakers will provide a brief overview of global opportunities in their work sector and personal perspectives of their careers in environmental toxicologic pathology. The goal of the panel discussion is to engage the audience and provide an opportunity to explore careers in this specialty.

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**Session 2**

1:30 PM–5:00 PM  
**Ballroom A**

**Toxicologic Pathology of Workplace Agents**  
*Co-Chairs: Ann Hubbs, DVM, PhD, DACVP, NIOSH, CDC, Morgantown, WV; and Peter Spencer, PhD, FANA, FRCPath, Oregon Health & Science University, Portland, OR*

The workplace environment often produces a different spectrum of exposures than those received by the general public. This session focuses on the pathology and pathogenesis of diseases associated with workplace environments. The talks emphasize the toxicologic pathology of occupational diseases that challenge workplaces today. Significant organic solvent exposure continues to occur in global workplaces, and the session begins with an update on mechanisms of y-diketone solvent neurotoxicity. Emerging and re-emerging occupational diseases and associated pathologies are addressed in talks on flavorings-related lung disease and on the ongoing outbreak of rapidly progressive pneumoconiosis in Appalachian coal miners. Lifestyle factors may interact with workplace exposures to influence the pathology of occupational disease, as will be discussed in a talk on the effect of dietary omega-3 fatty acids in silica-exposed lupus-prone NZBWF1 mice. The session will end with a panel discussion addressing a very important question: Can we predict/prevent occupational disease before workers get sick?

1:30 PM–1:35 PM  
**Introduction to Topic and Speakers**  
*Ann Hubbs, DVM, PhD, DACVP, NIOSH, CDC, Morgantown, WV*

1:35 PM–2:10 PM  
**Organic Solvent Neurotoxicity**  
*Peter Spencer, PhD, FANA, FRCPath, Oregon Health & Science University, Portland, OR*

2:10 PM–2:45 PM  
**Rapidly Progressive Pneumoconiosis in Appalachian Coal Miners: Clinical and Pathology Findings**  
*Robert Cohen, MD, FCCP, University of Illinois Chicago, Chicago, IL*

2:45 PM–3:15 PM  
**Silica, Lupus, and Dietary Omega-3 Fatty Acid Interventions**  
*Kathryn Wierenga, BA, Michigan State University, East Lansing, MI*

3:15 PM–3:50 PM  
**Panel Discussion**

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**Annual Business Meeting and Town Hall: If, When, and How to Undertake Blind Histopathologic Evaluation**

5:30 PM–7:00 PM  
**Ballroom A**

Town Hall will begin around 6:00 pm, immediately following the Business Meeting.

The 2019 Town Hall will discuss the pros and cons of blind histopathologic evaluation in animal toxicity studies and provide an open forum for discussing potential scenarios for appropriate and inappropriate application of blind slide reading.
Toxicologic pathologists are routinely engaged in the histopathologic evaluation of tissues from toxicology studies. Toxicology studies encompass a wide spectrum of agents that include drugs and biologics, chemicals (industrial, environmental and occupational), food additives, cosmetic ingredients, tobacco products, medical devices, and even physical agents such as radiation and noise. Toxicity assessments differ between such diverse agents depending on exposure settings, target populations, and safety assessment by the appropriate regulatory authorities. The objective of this session is to provide an overview of safety assessments in toxicology studies through examples where the safety decision has hinged on pathology end-points. This session is designed to maximize the cross-talk and collaboration between toxicologists/risk assessors and toxicologic pathologists, so that the differences in toxicity and risk assessments between diverse example agents are highlighted. Each example includes perspectives from a toxicologist and a pathologist; and the examples in this symposium session include a physical agent (cell phone radiation), environmental chemicals (hydrogen sulfide, acetaldehyde), polymer conjugated biologics (polyethylene glycol), and a food additive (myrcene) to provide an overview of the role of various regulatory agencies in the risk assessment of toxic agents.

8:00 AM–8:05 AM
Introduction
Deepa B. Rao, BVSc, MS, PhD, DABT, DACVP, US FDA, CDER, Silver Spring, MD

8:05 AM–8:30 AM
Purpose-Specific Toxicity and Risk Assessments
John C. Lipscomb, PhD, DABT, ATS, US EPA (retired), Cincinnati, OH

8:30 AM–9:05 AM
Toxicity Assessment of Food Additives: Myrcene, a Synthetic Flavoring Agent
Steve Mog, DVM, DACVP, US FDA, CFSAN, Silver Spring, MD; and Yu Janet Zang, PhD, DABT, US FDA, CFSAN, Silver Spring, MD

9:05 AM–9:35 AM
Cell Phone Radiation: Toxicity Assessment of a Physical Agent
Mark Cesta, DVM, PhD, DACVP, NIEHS/NTP, Research Triangle Park, NC; and Michael Wyde, PhD, NIEHS/NTP, Research Triangle Park, NC

9:35 AM–10:05 AM
Break: Exhibits and Poster Session

10:05 AM–11:30 AM
Polyethylene Glycol (PEG): Neurotoxicity Assessment of PEGylated Biologics
Armando R. Irizarry, DVM, PhD, DACVP, Eli Lilly & Company, Indianapolis, IN; and Deepa B. Rao, BVSc, MS, PhD, DABT, DACVP, US FDA, CDER, Silver Spring, MD

11:30 AM–12:00 PM
Panel

12:15 PM–1:15 PM
Exhibitor Hosted Session: AIRA Matrix
Room 302A

Afternoon
Free Time

1:30 PM–4:00 PM
Student Outing
Room 402
All Students and Invited Mentors. Sponsored by EPL, Inc.

Mystery Slide Session
7:30 PM–9:30 PM
Ballroom A
Sponsored by HistoTox Labs, Inc.

Environmental Toxicologic Histopathology
Co-Chairs: Ron A. Herbert, DVM, PhD, NIEHS/NTP, Research Triangle Park, NC; and Jerrold M. Ward, DVM, PhD, DACVP, Global Vet Pathology, Montgomery Village, MD

The Mystery Slide Session is intended to provide STP Annual Symposium attendees with the opportunity to expand their knowledge of environmental pathology through selected histopathology case review of lesions induced by exposure to environmental toxicants. Cases will be shared with STP membership via online whole-slide scans prior to the Symposium in order to stimulate discussion during the face-to-face session in Raleigh, NC. Cases will include induced non-neoplastic and neoplastic disease.

WEDNESDAY, JUNE 26

Session 4

8:00 AM–12:00 Noon
Balloom A

Endocrine Disruption and Reproductive Pathology
Co-Chairs: Jeffrey C. Wolf, DVM, DACVP, EPL, Inc., Sterling, VA; and Darlene Dixon, DVM, PhD, DACVP, NIEHS/NTP, Research Triangle Park, NC

During the past twenty years, investigations involving endocrine active substances (EAS) and reproductive toxicity have dominated the landscape of ecotoxicological research. This has occurred in concert with heightened awareness in the scientific community, general public, and governmental entities of the potential consequences of chemical perturbation in humans and wildlife.
The exponential growth of experimentation in this field is fueled by our expanding knowledge into the complex nature of endocrine systems and the intricacy of their interactions with xenobiotic agents. Complicating factors include the ever-increasing number of novel receptors and alternate mechanistic pathways that have come to light, effects of chemical mixtures in the environment versus those of single EAS laboratory exposures, the challenge of differentiating endocrine disruption from direct cytotoxicity, and the potential for transgenerational effects. Although initially concerned with EAS effects chiefly in the thyroid glands and reproductive organs, it is now recognized that anthropomorphic substances may also adversely affect the nervous and immune systems via hormonal mechanisms, and play substantial roles in metabolic diseases such as type 2 diabetes and obesity.

The six expert presenters and one highly motivated student in this session will cover a diverse variety of topics that are intended to provide an overview of the field as it currently stands, in addition to the latest cutting-edge research. At minimum, discussions will encompass known and potential effects of EAS in humans, non-human primates, rodents, and fish. Categories of EAS to be discussed will include agonists and antagonists of estrogenic and androgenic pathways, among others. In addition to histomorphology, presentations will demonstrate a variety of diagnostic approaches for investigating EAS effects, and developmental effects of EAS will be highlighted. Regulatory implications for chemicals suspected of having endocrine activity will be mentioned, and controversial aspects of EAS research will be briefly explored. It is hoped that attendees will leave this session with an enhanced understanding and appreciation for endocrine and reproductive toxicity and the associated pathological consequences.

8:00 AM–8:10 AM
Introduction
Jeffrey C. Wolf, DVM, DACVP, EPL, Inc., Sterling, VA

8:10 AM–8:45 AM
Antiandrogen Mixology: Cumulative Effects of Environmental Chemicals on Male Rat Reproductive Tract Development
Justin Conley, PhD, US EPA, Research Triangle Park, NC

8:45 AM–9:20 AM
Reproductive Consequences in Adult Female Mice following Developmental Estrogen Exposure: An ERα-Mediated Estrogen Response
Wendy Jefferson, PhD, NIEHS, Research Triangle Park, NC

9:20 AM–9:45 AM
Assigning Molecular and Physiological Mechanisms to the Pathology of the Endocrine Disrupting Chemical BPA
Scott Belcher, PhD, North Carolina State University, Raleigh, NC

9:45 AM–10:15 AM
Break: Exhibits and Poster Session

10:15 AM–10:45 AM
Combined Exposure to Low Doses of Three Anti-Androgens in Wistar Rats: Investigations and Results
Sibylle Groeters, DVM, BASF SE, Ludwigshafen am Rhein, Germany

10:45 AM–11:15 AM
Endogenous and Exogenous Influences on the Reproductive Tract of Nonhuman Primates
J. Mark Cline, DVM, PhD, DACVP, Wake Forest University School of Medicine, Winston-Salem, NC

11:15 AM–11:45 AM
Update on Intersex and Endocrine-Induced Reproductive Abnormalities in Fish
Mac Law, DVM, PhD, DACVP, North Carolina State College of Veterinary Medicine, Raleigh, NC

11:45 AM–12:00 PM
Student Presentation: Perinatal Di-(2-ethylhexyl) Phthalate Exacerbates Anaphylaxis in Male Offspring
Emily Mackey, BS, North Carolina State University, Raleigh, NC

IATP/STP Maronpot Guest Lecture Series
12:30 PM–1:30 PM
Room 301
Bridging the Gap between Toxicologic Pathologists and the Medical Device Industry
Co-Chairs: Darlene Dixon, DVM, PhD, DACVP, FIATP, NIEHS/NTP, Research Triangle Park, NC, and Robert R. Maronpot, DVM, MS, MPH, DABT, FIATP, Maronpot Consulting LLC, Raleigh, NC
Speaker: JoAnn C. L. Schuh, DVM, PhD, DACVP, DABT, JCL Schuh PLLC, Bainbridge Island, WA
This lunchtime workshop will explore the existing gap between the field of toxicologic pathology and the medical device industry and the need for toxicologic pathologists to improve this relationship.

Session 5
1:30 PM–5:00 PM
Ballroom A
Pathology in Ecological Research with Implications for One Health
Co-Chairs: Wanda Haschek-Hock, BVSc, PhD, DACVP, DABT, FIATP, University of Illinois, Urbana, IL, and Mac Law, DVM, PhD, DACVP, North Carolina State College of Veterinary Medicine, Raleigh, NC

Ecological toxicologic pathology is a relatively new field that builds on the science of environmental toxicologic pathology to study the effects of toxic substances and physical agents, especially pollutants, at the population, community, and ecosystem levels. The objective of this session is to illustrate the wide-ranging aspects of this field and the potential contributions of toxicologic pathology. This session explores the effects of pollutants on One Health beginning at the ecosystem level, including microbes, insects, fish and humans. Presentations will explore the interaction of pesticides, pathogens, phytochemicals and xenobiotic biotransformation in bee colony losses critical for food security (honey bees have been proposed as models for gut microbiota research and recently listed under the 2017 US FDA veterinary feed directive); the role of pathology in identifying the effects of pollutants on fish as sentinels for human health; the effects climate and nutrients on harmful algal blooms and toxin
production leading to animal and human disease; the processing of environmental carcinogens by intestinal microbiota; and the clinical pathology of per- and polyfluoroalkyl substances (PFAS) that can persist in the environment and contaminate drinking water.

1:30 PM–1:35 PM
Introduction to Topic and Speakers
Mac Law, DVM, PhD, DACVP, North Carolina State College of Veterinary Medicine, Raleigh, NC

1:35 PM–2:10 PM
Honey Bees and the Four Ps—Pesticides, Pathogens, P-coumaric Acid, and P450s
May R. Berenbaum, PhD, University of Illinois, Urbana, IL

2:10 PM–2:45 PM
Integration of Pathology in the Assessment of Adaptation to PAHs in Atlantic Killifish (Fundulus heteroclitus)
David E. Hinton, PhD, Duke University, Durham, NC

2:45 PM–3:10 PM
Biochemical and Hematologic Changes in 28-Day Rat Studies of Seven Per- and Polyfluoroalkyl Substances (PFAS)—Beyond PFOA and PFOS
Michelle Cora, DVM, DACVP, NIEHS/NTP, Research Triangle Park, NC

3:10 PM–3:40 PM
Break

3:40 PM–4:20 PM
The Occurrence and Toxicological Effects of Freshwater Cyanobacterial Toxins
Neil Chernoff, PhD, US EPA, Research Triangle Park, NC; and Gregory S. Travlos, DVM, DACVP, NIEHS/NTP, Research Triangle Park, NC

4:20 PM–5:00 PM
Processing of Environmental Carcinogens by the Intestinal Microbiota
Aadra Bhatt, PhD, University of North Carolina at Chapel Hill, Chapel Hill, NC

5:30 PM–6:30 PM
Awards and Recognition Ceremony
Ballroom A

The President’s Reception immediately follows the Awards and Recognition Ceremony.

7:00 PM–9:00 PM
President’s Reception
Ballroom B

Supported, in part, by a generous grant from EPL Inc.

THURSDAY, JUNE 27
Session 6

8:00 AM–12:00 Noon
Ballroom A

Integration of Big Data Technologies with Toxicologic Pathology
Co-Chairs: Charles E. Wood, DVM, PhD, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT; and Matt Martin, PhD, Pfizer, Inc., Groton, CT

Large-scale bioinformatic tools play an increasingly important role in environmental health, as well as translational and regulatory science. The Thursday morning session will address emerging concepts and drivers related to the integration of these new technologies in current toxicologic pathology practice. Talks will explore how big data analytics can be used to guide nonclinical testing strategies, streamline diagnostics, enhance target discovery, and inform interpretation of pathology outcomes. Topics will range from alternative toxicological models to use of digital pathology and machine learning. Speakers will also discuss issues, challenges, and future directions related to translation and use of molecular information in pathology.

8:00 AM–8:10 AM
Introduction to Topic and Speakers
Matt Martin, PhD, Pfizer, Inc., Groton, CT

8:10 AM–8:45 AM
Use of Alternative Methods/Technologies/Data Types in Hazard Characterization
Warren Casey, PhD, NIEHS/NTP, Durham, NC

8:45 AM–9:20 AM
Diagnostic Applications of Artificial Intelligence and Machine Learning in Pathology
Ilan Wapinski, PhD, PathAI, Boston, MA

9:20 AM–9:45 AM
Bridging the Gap between Data Sciences and Toxicologic Pathology: Chemical Screening and Prioritization
Sean Watford, PhD, Booz Allen Hamilton, Rockville, MD

9:45 AM–10:15 AM
Break

10:15 AM–10:50 AM
Regulatory Perspective of Whole Slide Imaging and Digital Pathology in Nonclinical Safety Assessment
LuAnn McKinney, DVM, DACVP, US FDA, CDER, Silver Spring, MD

10:50 AM–11:25 AM
Molecular Applications for Target Identification in Archival FFPE Tissue Samples
Charles E. Wood, DVM, PhD, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT

11:25 AM–12:00 PM
Panel Discussion

12:00 Noon
Meeting Adjourned
Poster Setup and Presentation Times

**Poster Setup**
Sunday, June 23 ..................................................... 8:00 AM–4:00 PM
Your poster must be set up by 4:00 PM on Sunday, June 23.

**Poster Presentation Times**
(Please plan to attend your posters during the following times).
Sunday, June 23 (Welcome Reception) .......... 6:00 PM–6:30 PM
Monday, June 24 .............................................. 10:20 AM–10:50 AM
.............................................................................. and 2:45 PM–3:15 PM
Tuesday, June 25 ................................................. 9:35 AM–10:05 AM
Wednesday, June 26 .............................................. 9:45 AM–10:15 AM

**Young Investigator Judging Times**
Monday, June 24 ............................................. 10:20 AM–10:50 AM
.............................................................................. and 2:45 PM–3:15 PM
Tuesday, June 25 ................................................ 9:35 AM–10:05 AM

**Poster Teardown**
Wednesday, June 26 ............................................... 1:00 PM–2:00 PM
Posters not removed by 2:00 pm, Wednesday, June 26, will be taken to the Registration Desk for pickup.
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38th Annual Symposium Exhibitors

Exhibit Hall Hours

Exhibitor Setup
(All exhibits must be set up by 4:00 pm on Sunday.)
Saturday, June 22 .................................. 1:00 PM–4:00 PM
Sunday, June 23 ..................................... 8:00 AM–4:00 PM

Exhibit Hall Hours
Sunday, June 23 .................................. 5:00 PM–7:00 PM
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Monday, June 24 .................................. 9:00 AM–4:00 PM
Tuesday, June 25 ................................. 9:00 AM–1:00 PM
Wednesday, June 26 .............................. 9:00 AM–1:00 PM

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   Wednesday, June 26 ............................ 1:00 PM–4:00 PM

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The American College of Toxicology is a professional organization of more than 1,000 toxicologists who work primarily in pharmaceutical and biotech companies, contract research organizations, regulatory agencies, or as consultants. ACT serves its members by promoting the exchange of information and perspectives on applied toxicology and safety assessment through year round educational opportunities, an Annual Meeting, and its peer reviewed scientific journal, *International Journal of Toxicology*.

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Germany
Contact: Sibylle Groeters
Phone: 45 44434525
Fax: 45 30754524
sibylle.groeters@basf.com
Website: www.eurotoxpath.org

The European Society of Toxicologic Pathology (ESTP) was established in 2002. ESTP has currently approximately 300 members most of which are originating from Europe. In total, 26 countries are represented, 11 of which are overseas. Goals: To promote toxicologic pathology not only in Europe but also globally by participating in activities together with other STPs. One major task is the completion of the INHAND initiative. Our annual congresses are considered of high quality, the next will be held in Cologne, Germany in September 2019.

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The Society of Toxicologic Pathology (STP) is a nonprofit association of toxicologists, toxicologic pathologists and other scientists whose principal aim is the advancement of pathology as it pertains to changes elicited by pharmacological, chemical and environmental agents, and factors that modify these responses. As an international leader in the field, the Society is focused on the improvement of human, animal, and environmental health using an interdisciplinary scientific approach based in pathology and toxicology.

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