Chairperson's Message

Dear Colleagues:

It has been a busy time as we transition to more normal aspects of life while still dealing with disruptions due to the ongoing COVID pandemic. Educators have gone above and beyond to transform learning and accommodate the many struggles faced by our students and colleagues. This hard work and collaborative spirit are to be commended. SOT, with excellent precautions in place, was successful in returning to an in-person meeting in San Diego while still retaining some virtual options for those not yet ready to travel. I hope many of you were able to join.

This summer 31 students engaged in research at 9 institutions throughout the country with FUTURE-supported internships. Members of the FUTURE committee met with those students at the end of their experiences and were debriefed about their work. We hope that many of those interns, and other undergraduate researchers apply for the SOT Travel Award (due October 17th) to support their travel and attendance at the 2023 SOT meeting in Nashville.

For educators, there are still opportunities to support undergraduate research projects and professional development with our faculty grants. The ToxScholar program is available for in person or virtual visits both within country and out of country. Think about whether you could make a visit or would like to have a ToxScholar come and talk at your school.

We are also seeking additional teaching resources through our collaboration with CourseSource, an on-line peer reviewed journal publishing evidence-based life science teaching resources. Since we have established the Toxicology Learning Framework this gives undergraduate educators an opportunity to publish resources on CourseSource.

There are so many other opportunities available to get involved through FUTURE. We hope to see you at some of our upcoming programing.

Please reach out if you need more information or help taking advantage of the many programs FUTURE has available for you and your students.

Emily Ford, Chair, FUTURE Committee
Associate Professor of Biology and Chair, Department of Physical and Biological Sciences at Western New England University
Undergraduate Awards

SOT has a variety of awards to support undergraduate students attending the Annual Meeting and for other activities. **The deadline is October 17** for the SOT undergraduate awards; if an accepted abstract is a criterion, the abstract also must be submitted by October 17. See [Awards for Undergraduate Students](#) for a complete listing, including component group awards. A student may apply for any award for which they are eligible, but in one year, will only receive one of the national awards that provides travel support for the Annual Meeting.

1. SOT funding provides support for travel, lodging, and access to special undergraduate activities at the SOT Annual Meeting.

**Undergraduate Diversity Program Student Travel Award**
Students are selected to attend the three-day Undergraduate Diversity Program and receive meeting registration, travel funding, and lodging. Students must be US citizens or permanent residents and meet at least one of these criteria: from a racial/ethnic group that is underrepresented in the sciences (e.g., Black/African American, Latinx, Native American, Pacific Islander), first generation college, from an institution that does not have biomedical graduate degrees, or a member of an underserved population.
- [Student Information and Application](#)

**Undergraduate Diversity Program Advisor Travel Award**
Faculty who are not members of SOT can apply for the Undergraduate Diversity Program Advisor Travel Award. Those receiving the award receive meeting registration, travel funding, and lodging and attend the Undergraduate Diversity program.
- [Faculty Information and Application](#)

**SOT Undergraduate Research Award**
Undergraduate students who submit abstracts can apply for this award. Abstracts are due October 17. Awardees receive meeting registration, travel funding, lodging, and special recognition.
- [Information and Application](#)

**Perry J. Gehring Diversity Student Travel Award**
Students who 1) received the Undergraduate Diversity Award within the last four years, 2) submit an abstract for the meeting, and 3) are from racial/ethnic groups under-represented in the sciences can apply for this travel award.
- [Information and Application](#)
**Undergraduate Activities**

**Undergraduate Education Program Sunday, March 19**
Undergraduate students learn more about the variety of science related to toxicology through presentations and a case study, with the opportunity to network with graduate students and toxicologists. Breakout sessions feature tips on applying to and succeeding in graduate school and career opportunities in different employment sectors. The afternoon concludes with open time to meet with representatives of various graduate programs in toxicology.

**Student/Postdoctoral Scholar Mixer Sunday, March 19**
This event, which follows the SOT Welcome Reception, is the opportunity for undergraduates to network with other undergraduates, graduate students, and postdoctoral scholars as well as learn more about involvement in SOT component groups.

**In Vitro Lecture and Luncheon Monday, March 20**
During lunch, the speaker will present a case study topic which will then be discussed at each table. Guests at this event include undergraduates, graduate students, and postdoctoral scholars, and the toxicologists who serve as hosts and discussion facilitators.

**Undergraduate Student Meeting Tuesday, March 21**
All undergraduate students are invited to this informal gathering to learn more about engaging with SOT and to network with graduate students. Learn about their experiences as trainees and what different graduate programs are like.

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**2. Additional Undergraduate Funding**

**Diversity Initiatives Endowment Career Development Award**
Undergraduate Affiliates and Graduate Student members from groups underrepresented in the sciences can apply for up to $1,000 funding to support personal and professional development experiences. Application deadline will be in April 2023.

- Information and Application.

**RC4 Undergraduate Travel Award**
This award is provided by the Regional Chapter Communication and Collaboration Group (RC4) to support travel of undergraduate students to the SOT Annual Meeting to present a poster on a toxicology-related project. The applicant is a member of the Regional Chapter (RC), conducted research in the laboratory of a RC member mentor and submits the application to that RC. The RC sets the deadline and submits one nominee to the RC4 by October 17. The RC4 selects the students for the $1,100 award.

- Information and application.

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**SOT Undergraduate Educator Award Education Award**

Application Deadline: October 9
Calling All Educators! Bring Your Innovations in Education to the 2023 SOT Annual Meeting!

Consider submitting a poster summarizing your efforts and successes in education and training in toxicology-related areas to the poster session on Education, Ethical, Legal and Social Issues (EELSI). The deadline for submission of abstracts is December 1, 2022.

Toxicology education occurs at all levels, from outreach to the public to K-12, undergraduate, graduate, and professional training. The EELSI poster session is an excellent opportunity to share your work with others and to network with other toxicology educators.

Special Call for Posters on Innovations in Response to COVID Pandemic!

What education innovations have you developed over the past 2-3 years to accommodate virtual and hybrid learning environments?

What innovations implemented during COVID-19 pandemic do you plan to continue using and/or building upon post-pandemic?

Topics of Interest Include, But Are Not Limited to:

- Toxicology content for undergraduate courses
- Risk communication at all educational levels
- Toxicology laboratory activities
- Summer research experiences for high school and undergraduate students
- Innovative methods of teaching
- Graduate mentoring innovations
- Career development training
- Active learning and problem-based learning in toxicology
- Translating toxicology to the public
- Programs to improve recruitment into the discipline of toxicology
- Innovative diversity and equity efforts in education

Guidelines for Writing an Effective Education Abstract:

- What is the activity and its connection to toxicology?
- How does the activity inform, or how is the activity informed by, literature or national calls to actions (e.g., from NRC, AAAS, NSF, etc.)?
- Who is in the population being served?
- What are the learning outcomes/objectives for the activity?
- What are the details of the activity that can inform other practitioners?
- How has the effectiveness of the activity been evaluated?

Additional Details

As for all abstracts, the SOT Program Committee will review submissions. Abstracts describing new initiatives or science policy in the regulatory community must clearly describe the impact on the practice of toxicology and/or risk assessment. Care should be taken to distinguish between statements based on documented facts versus opinions. Literature surveys or reviews and background materials are insufficient in and of themselves. For studies that do not describe laboratory or field experiments authors should (1) describe the research or assessment approach instead of experimental procedures, (2) summarize the study’s results or findings explicitly, and (3) clearly articulate the implications for stakeholders. For additional information, guidelines, and instructions, please consult SOT Abstract Directions for the 2023 Annual Meeting.
Spotlight on Undergraduate Faculty Research Grants

The Undergraduate Faculty Research Grant program is one valuable mechanism that SOT has identified as an important strategic goal aimed at recruitment and retention of undergraduate students in toxicology. This program supports faculty grants for training of undergraduate students through a toxicology-based research experience. Funding is also available to support faculty development activities. Applications are reviewed by the FUTURE Committee. Additional information can be found on the SOT website for the research and development grants.

Recent examples for the success of this grant program during the 2021-2022 cycle include the research experience of Shenell Brown in the laboratory of Dr. Dolapo Adedeji at Elizabeth City State University and Arina Kazakova and Kevin Bayingana in the laboratory of Dr. Eva-Maria Collins at Swarthmore College. For more information on the mentor and student perspectives on undergraduate research experiences, see these recent blogs:

[SOT_Undergraduate_Faculty_Research_Grant_Helps_Student Present at and Attend SOT Meeting for the First Time](#)

[SOT_Undergraduate_Faculty_Research_Grant_Enables_Authentic Undergraduate Toxicology Research](#)

For the 2022-2023 cycle, the FUTURE Committee selected four recipients of SOT Undergraduate Faculty Research Grant. Margaret Bell at DePaul University and student Catalina Torres Reyes will investigate the mechanisms by which PCBs will prime microglial responses to a secondary challenge in age- and sex-specific ways, comparing cells from neonatal and adolescent animals. David Blake at Fort Lewis College will split funds between support for Danielle Gonzales and supplies. Their project evaluates the toxicity of two natural compounds, sulforaphane (SFN) and deoxyalpinoid B (DAB), on human macrophages as potential replacements for toxic drugs used to treat visceral leishmaniasis. Julie Goss at the University of Maine will fund Patrick Fleming to investigate the eukaryotic toxicity of cetylpyridinium chloride, a cationic quaternary ammonium antimicrobial used widely in personal care and food products, although its eukaryotic effects are largely unknown. Karin Streifel from Regis University is using the funds for supplies for research assessing mRNA levels of inflammatory cytokines in the gastrointestinal tracts of their Mn Mouse Model via RT-PCR; Celine Campos is the student researcher.

[SOT_Undergraduate_Faculty_Research_Grant_Helps_Student Present at and Attend SOT Meeting for the First Time](#)

[SOT_Undergraduate_Faculty_Research_Grant_Enables_Authentic Undergraduate Toxicology Research](#)
The Toxicology Mentoring and Skills Development Training Program (ToxMSDT) is a five-year program funded by the National Institute of Health (NIH) providing career development opportunities for STEM undergraduate students from diverse underrepresented backgrounds. The goal of the program is to build a pathway for students from underserved communities to enter graduate toxicology programs and eventually choose a career in toxicology.

This unique one-year long mentoring and skills development training program is hosted by the University of California, Davis (UCD), housed in the Department of Molecular Biosciences. Other members of the consortium are the Society of Toxicology, Iowa State University, Tuskegee University, The Ohio State University, and Michigan State University.

Annually, 25 undergraduate students are competitively selected from institutions of higher education nationwide. Each student mentee is matched 1:1 with volunteer mentors from industry, academia, government, or nonprofit entities from across the country. The program begins with a kick-off mentee/mentor training workshop at UCD. Future in-person events include mentees shadowing their respective mentors at their places of work, attending the Society of Toxicology Annual Meeting, and participation in capstone activities at Tuskegee University, where successful candidates will receive a Certificate of Completion at the culmination of the program. The new ToxMSDT cohort for the 2022-23 program has just been selected. Please watch for upcoming recruitment announcements for the 2022-23 program season and encourage your students to apply. Applications will open February 15, 2023.

Additional program components include the completion of online learning modules providing knowledge about important topics in toxicology ranging from “Principles of Toxicology” to “Applied Systems Toxicology.” These learning modules are open educational resources and freely available and accessible to the public 24/7 on the ToxMSDT website.

The learning modules are being reviewed and updated on an ongoing basis, while case studies are being developed to enhance student learning. Watch for your opportunity to contribute: calls for reviewers and developers are sent through SOT blogs and messages to the Undergraduate Educator Network.

For more information contact Pia van Benthem, Program Manager.
SOT Internship Funding Boosts Toxicology Research

The seeds planted several years ago by the Society of Toxicology to support summer internships bloomed big-time at Northern Kentucky University. From a mere two interns in the first year of funding back in 2017, FUTURE funding supported NINE students in three different labs for Summer 2022. This meant students had opportunities in Environmental Science and Biochemistry as well as in Chris Curran’s developmental neurotoxicology lab.

The interns were Lillian Lown, Briannia Quarles, Gabrielle Kerr, Christopher Ernst, Alexandra Walsh, Abilene Morgan, Emily Collier, Julia Fosua, Mireku Ampadu, and Kalyani Abbaraju. The new faculty mentors AND new SOT members are Drs. Allison Parker and Patrick Hare. All students received matching funds through the NKU UR-STEM program to encourage at-risk and underrepresented students to get involved with research early in their college careers.

Faculty and students all participated in “Tox Talks” that started with a discussion of major environmental issues and historic figures such as Rachel Carson. When students asked if they wanted the discussions to continue beyond the period of the internship, the vote was unanimous in favor of learning more. Thanks to FUTURE and SOT for their critical financial support!

It was a wonderful example of stretching dollars and spreading the word about the importance of toxicology. Dr. Parker became involved in the program in 2021, and Dr. Hare joined in 2022. Dr. Parker's work focuses on understanding how ticks and mosquitoes can be more safely controlled to prevent the spread of disease. Dr. Hare looks at degradation of endocrine disrupters with a focus on estrogenic compounds.

Submitted by Christine Perdan Curran, Northern Kentucky University

To learn more or apply, visit SOT Internship Program Support. Deadline for Summer 2023 Internships is January 7th
SOT has partnered with CourseSource to create a Toxicology Learning Framework for undergraduate toxicology courses. This is a free resource that was created in order to “facilitate the development and sharing of evidence-based teaching materials for undergraduate toxicology educators.” The Framework includes five Core Concepts (Evolution, Biological Information, Risk and Risk Management, Systems Toxicology, and Pathways and Transformations for Energy and Matter) with toxicology-related learning objectives. SOT is actively recruiting submissions to add to the toxicology collection. Articles use the Toxicology Learning Framework to articulate learning objectives. To learn more, refer to this journal article or the recent workshop presented at the 2022 SOT Annual Meeting (Publishing Educational Toxicology Exercises in CourseSource: A Step-by-Step Workshop for Preparing Your Manuscript). A huge thank you to the organizers of this workshop: Joshua Gray, Mindy Reynolds, Lauren Aleksunes, and Erin Vinson.

Some recent toxicology-related CourseSource publications include:

- Nanoparticles and Shrimp: An Interdisciplinary Lab Series in Chemistry and Biology for Undergraduate Engineering Students by Laure E. Grove, Ryan P. Rogers, and Sara Alibeik of Wentworth Institute of Technology.
- Air Quality Data Mining: Mining the US EPA AirData website for student-led evaluation of air quality issues by Mary Williams, of the Minnesota Pollution Control Agency and Katherine Barry and Deena Wassenberg of the University of Minnesota.
- Using Zebrafish in a Developmental Biology Lab Course to Explore Interactions Between Development and the Environment by Robin H. Cresiski of the University of Maryland Baltimore County and Jenny R. Lenkowski of Goucher College.
- Pesticides in My Smoothie Bowl? by Shuangying Yu of Central Piedmont Community College and Scott M. Weir of Queens University of Charlotte.

**In case you missed it!!**

Recordings and slides are available from the NCABR Network Toxicology Curriculum Webinar Series. The series addresses key concepts in the Toxicology Learning Framework, and are available online.

- **September 1, 2021:** Introduction to Core Concepts of Toxicology
- **September 29, 2021:** Core Concept: A Focus on Evolution
- **October 18, 2021:** Core Concept: Biological Information—Toxicology and the Genome
- **November 22, 2021:** Core Concept: Pathways and Transformations of Toxicants, from Dose-Response to ADME
- **December 14, 2021:** Core Concept: Systems Toxicology
- **January 28, 2022:** Core Concept: Risk Assessment
- **April 11, 2022:** A Culmination of Core Concepts to Teach Toxicology (including resources at Beyond Benign)
Q: Describe your journey in toxicology. When did you first become interested in the subject?
I became interested in toxicology when I joined the PhD program in Physiology at the University of Arizona. My PhD mentor began a collaboration with a toxicologist to examine the effects of 4-vinylcyclohexene diepoxide on the ovary. I was lucky enough to work on the project and have been conducting ovarian toxicology research ever since then.

Q: How has being a member of the FUTURE Committee of SOT helped you from a faculty development perspective?
I have learned from others on the committee ways to improve teaching undergrads and ways to involve undergrads in toxicology. I was not fortunate enough to be exposed to toxicology as an undergrad so I have enjoyed helping expose undergrads to the field.

Q: What advice can you give to members of the UEN who are new to toxicology or who are looking to incorporate toxicology into the courses they teach?
Take the opportunity to learn from other members how they include toxicology in their lectures, volunteer to give toxicology lectures to undergrads, and include the undergrads in research.

Q: In three to four sentences, which is not easy to do, describe your research to our readership.
My lab focuses on studying the effects of environmental chemicals on the ovary and female reproductive system. We are particularly interested in chemicals that are in plastics, personal care products, and pesticides. We study the effects of the chemicals using cell culture, mouse models, and human samples.

Q: Aside from toxicology, what hobbies or other interests do you pursue?
Traveling, hiking, and enjoying time with family and friends.

Q: How can toxicology help to make a more equitable and inclusive world?
By making sure to recruit and retain underrepresented people into the field; focusing efforts on reducing and eliminating toxic exposures in groups that have been disproportionately affected by chemical exposures; leading efforts to make policy changes that lead to environmental justice.

Q: This is your final year on the FUTURE committee. What will you miss most about serving SOT in this way?
Getting to interact with undergraduate students at SOT and interacting with undergraduate educators.

FUTURE also welcomes the following new members to the committee:
Drs. Santhosh Bommegowda (Biogen), Tirupapuliyur Damodaran (North Carolina Central University), Nikolay (Nick) Filipov (University of Georgia), AtLee Watson (Inotiv), and Kimberly Zaccaria (SRC, Inc.).
Can You Help Educate Undergraduates About Toxicology and Career Opportunities?

The SOT ToxScholar Program provides an opportunity for SOT members to visit primarily undergraduate college campuses domestically or internationally to present toxicology content to students majoring in disciplines such as chemistry, biology, and environmental science and to discuss career opportunities in toxicology.

What’s needed, and how can you help?
The ToxScholar program has been existence for several years. What is currently limiting success is the identification of undergraduate institutions interested in hosting a ToxScholar visitor. If you know of an institution or have a contact at a college who might be interested in raising awareness in toxicology among their students, please direct them to the SOT ToxScholar page for additional details on applying to the program.

Interested in becoming a ToxScholar visitor?
If you are interested in planning a visit yourself and have identified a college and potential host, you can apply for SOT funds to help defray the cost of your visit. The application process is straightforward, and the deadlines are January 15, April 1, and September 1. For more information, visit the SOT ToxScholar page.

US states and other countries in red have benefitted from the ToxScholar Program.