



IIT UPDATE

INSTITUTE FOR INTEGRATIVE TOXICOLOGY

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IIT Affiliates Recognized at 63rd SOT Meeting in Utah

Students and faculty of the MSU Institute for Integrative Toxicology were excited to attend and present at this year’s 63rd annual Society of Toxicology (SOT) meeting held in Salt Lake City, Utah.

The SOT annual meeting brings together 5,000 plus toxicologists and those working in areas related to toxicology to share the latest science and technology in the field, as well as to make new connections, gather with friends, and engage in mentoring and professional development. This year’s meeting was held from March 10-14, 2024.

The following students affiliated with IIT received recognition:

» **Romina González-Pons**, training with Dr. Jamie Bernard, received the Bristol Myers Squibb Graduate Student Research Training Award to Promote Diversity in Toxicology, for her project, “Adiposity Facilitates Breast Cancer via Kynurenine-Triggered Aryl Hydrocarbon Receptor Activity: Insights into Environmental AhR Agonists’ Impact on Tumor Development.”

» **Isha Khan**, training with Dr. Norbert Kaminski, received the Excellence in Research Award from the Stem Cell Specialty Section of the SOT. Khan’s 2024 SOT abstract was, “Single Cell Transcriptomics Reveals Key Phenotypic and Signaling Alterations with TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) in an In Vitro Model of Human Hematopoiesis.”

» **Samantha Musso**, training with Dr. Jamie Bernard, received first place for the CSS Dharm V. Singh Carcinogenesis Graduate Student Endowment Award in SOT’s Carcinogenesis Specialty Section for her abstract, “Associations Between Chemical Exposures and Markers of Multiple Myeloma Pre-Cancers: AN NHANES Analysis.”

» **Ebenazar Okoyeocha**, training with Dr. Neera Tewari-Singh, received the SOT Graduate Student Travel Support Award as well as the SOT Ocular Toxicology Specialty Section (OTSS) Graduate Student and Postdoctoral Fellow Trainee Support Award for his abstract, “Elucidating the Role of the Nrf2

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IIT Affiliates at SOT in UT cont.

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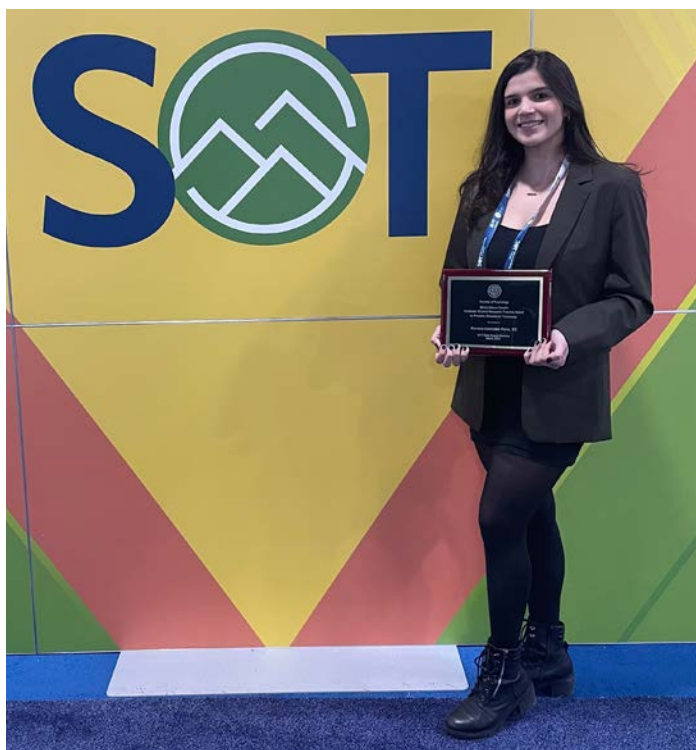
Pathway in Chloropicrin Ocular Toxicity.” He was also elected as the Graduate Student Representative for the Ocular Toxicology Specialty Section Executive Committee of the SOT.

» **Andrew Roney**, training with Dr. Neera Tewari-Singh, received the SOT Dermal Toxicology Specialty Section Edgewell Personal Care Student Award for excellence in research relating to dermal toxicology for his abstract, “*Long-Term Inflammatory Effects Arising From Acute Cutaneous Nitrogen Mustard Exposure.*” He was also elected as the Graduate Student Representative for the Dermal Toxicology Specialty Section Executive Committee of the SOT.

» **Christine Wei**, training with Dr. Jim Luyendyk, was awarded the Carl C. Smith Graduate Student 1st place award from the SOT Mechanisms Specialty Section, as well as the Jean Lu Scholarship Award from the SOT American Association of Chinese in Toxicology, for her abstract, “*Coagulation Factor XIII and Tissue Transglutaminase Cooperatively Mediate Atypical Fibrin(ogen) Cross-linking in the Acetaminophen-injured Liver.*”

And lastly, IIT-affiliated faculty member **Dr. Neera Tewari-Singh** was elected as the Vice-President Elect for the Ocular Toxicology Specialty Section Executive Committee and the Association of Scientists of India Origin (ASIO) of the SOT.

Congratulations to all the IIT-affiliated SOT award winners this year! 🎉



Above: EITS graduate student **Romina González-Pons** with her Bristol Myers Squibb Graduate Student Research Training Award to Promote Diversity in Toxicology at the 63rd SOT Annual Meeting.

Left: EITS graduate student **Isha Khan** with mentor and IIT Director **Norbert Kaminski** after receiving his Excellence in Research Award from the Stem Cell Specialty Section of the SOT.



IIT Welcomes New EITS Students

The IIT is pleased to welcome the following students who have joined the EITS program in the last several months:

» **Vanessa Estrada**

Microbiology, Genetics & Immunology
Mentor: Dr. James Pestka

» **Chenxi Li**

Plant, Soil & Microbial Sciences
Mentor: Dr. Wei Zhang

» **Adrian Manlicli**

Fisheries and Wildlife
Mentor: Dr. Cheryl Murphy

» **Rachael Mthiko**

Food Science & Human Nutrition
Mentor: Dr. Leslie Bourquin

» **Kamila Sadko**

Pharmacology & Toxicology
Mentor: Dr. Adam Lauver

» **Rachel Sheffler**

Comparative Medicine & Integrative Biology
Mentor: Dr. John Buchweitz

Luyendyk Elected Vice President-Elect of SOT



The IIT would like to offer our congratulations to **Dr. James P. Luyendyk**, IIT-affiliated faculty member in the Department of Pathobiology and Diagnostic Investigation, who was recently elected vice president-elect for the Society of Toxicology. His election to this office at the SOT will lead to his serving as vice president and then as president of the society.

After earning his Ph.D. in Pharmacology and Toxicology with a dual major in Environmental Toxicology from the IIT's EITS graduate training program in

2004, Dr. Luyendyk conducted his postdoctoral training at the Scripps Research Institute in La Jolla, California, studying immunology and hemostasis. He then began his career in academia, first at the University of Kansas Medical Center as an Assistant Professor and thereafter joining the Michigan State University faculty as an Associate Professor. Dr. Luyendyk currently serves as a Professor in the Department of Pathobiology and Diagnostic Investigation and as a member of the IIT.

Dr. Luyendyk is a leader in the fields of toxicology, hepatology, and hematology, evidenced not only by the more than 100 peer-reviewed publications and multiple book chapters that compose his publication repertoire, but also by his numerous regional, national, and international speaking engagements. His research, involving both drug and environmental exposures, explores the mechanisms by which blood-clotting factors contribute to liver disease, which has challenged assumptions in multiple fields, including toxicology, and has inverted perceptions on the role coagulation factors play in the liver's response to toxicants.

IIT Hosts Four Seminars During Spring 2024

The IIT was delighted to once again host the IIT Seminar Series this spring with three exciting seminars, as well as the 3rd Annual Jerry Hook Distinguished Lectureship.

The IIT hosted **Dr. Joshua Harrill**, Center for Computational Toxicology and Exposure, U.S. EPA, on January 30. He spoke on, "High-Throughput Phenotypic Profiling with the Cell Painting Assay and Applications for Next Generation Risk Assessment." Researchers at the U.S. EPA have proposed a tiered in vitro and in silico chemical hazard evaluation strategy where high-throughput profiling (HTP) assays are used in the first tier to rapidly generate bioactivity data for hundreds

of chemicals in a variety of human-derived cell models. High-throughput phenotypic profiling (HTPP) with the Cell Painting assay is a component of Tier I screening that is used to: 1) determine molecular points-of-departure (mPODs) that correspond to threshold concentrations where cellular biology is perturbed and 2) generate phenotypic profiles that characterize the biological activity(s) of the test chemicals. Harrill's presentation described the implementation of the Cell Painting assay at U.S. EPA and potential applications for Cell

Past MSU SOT Presidents

The MSU IIT is proud to announce Dr. Luyendyk's appointment as he continues a rich tradition of SOT presidents associated with our institution. He will be the tenth IIT-affiliated SOT president to hold office.

Other past SOT presidents include:

Patricia E. Ganey

President from 2017-2018
Emeritus faculty member

Norbert E. Kaminski

President from 2014-2015
Current IIT and CRIS Director

Michael P. Holsapple

President from 2010-2011
Former CRIS Director

Kendall B. Wallace

President from 2005 - 2006
Former doctoral trainee

Jay I. Goodman

President from 1999 - 2000
Emeritus faculty member

James S. Bus

President from 1996 - 1997
Former doctoral trainee

James E. Gibson

President from 1988 - 1989
Former faculty member

Jerry B. Hook

President from 1987 - 1988
Founding director of the CIT

Perry J. Gehring

President from 1980 - 1981
Former faculty member

Congratulations to Dr. Luyendyk on this prestigious accomplishment!

Painting data in chemical risk assessment, including bioactivity exposure ratio (BER) analysis, chemical grouping and mechanistic inference.

On February 20 the IIT hosted **Dr. Natalie Johnson** from Texas A&M University. Johnson's research interests include air pollution exposure, partic-

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IIT Faculty Honored at 2024 MSU Investiture Ceremony

Three IIT-affiliated faculty were among those honored at MSU's 2024 Investiture for Endowed Faculty on March 4, 2024: Dr. Honglei Chen, Dr. Norbert Kaminski and Dr. James Luyendyk.

On his first day at MSU, President Guskiewicz and hundreds of guests attended the investiture of the 2024 class of endowed chairs, endowed professors and MSU Research Foundation Professors to honor those faculty and the donors who support the esteemed positions. These 38 faculty lead MSU in its commitment to academic excellence and innovation.

"At Michigan State, we are building a culture that celebrates and rewards faculty achievements and builds a community of bright minds, crossing disciplines and departments," Guskiewicz said. "Our faculty are not only doing incredibly impactful work in areas of great need and opportunity but also providing mentorship and inspiration to the next generation."

Faculty are recognized as endowed professors through their leadership in their classrooms and their respective field and for their growing body of research. Through resources to help fund and build their research, these faculty grow collaborative networks and deliver to students a rich classroom experience in the topics they specialize in.

The honor of endowed and named chairs are awarded to faculty members with significant experience and accomplishments, a network of collaborators and an extensive body of research. Endowed chairs receive private funding, and named chairs receive grants allowing them to further their work, publish findings, travel to conferences and provide research experiences for promising students. The work of endowed chairs and named chairs helps MSU maintain its standing as a leader among other universities and research institutions around the world.

The MSU Research Foundation established the titles of MSU Research Foundation Professor and Red Cedar Distinguished Professor in 2014 and 2022, respectively. These titles are awarded to accomplished faculty, both current and incoming. The aim of the recognition is to enhance MSU's stature in research and creative activity.

The IIT-affiliated faculty honored at the ceremony were:



Dr. Honglei Chen was named a MSU Research Foundation Professor. Chen is a professor in the Department of Epidemiology and Biostatistics whose research focuses on studying environmental causes of neurodegenerative diseases, with

the ultimate goal of disease prevention and healthy aging. To achieve this, he is focused on three primary areas: searching for environmental causes of Parkinson's disease and neurodegeneration; understanding the complexity of prodromal neurodegeneration and the roles of the environment; and studying poor olfaction as a "miner's canary" foretelling deteriorating health in older adults.



Dr. Norbert Kaminski was named Food and Consumer Product Ingredient Safety Endowed Chair. Kaminski is the director of the Institute for Integrative Toxicology and the Center for Research on Ingredient Safety and is a professor

in the Department of Pharmacology and Toxicology. Broadly, his research focuses on immunopharmacology and immunotoxicology, with an emphasis on the elucidation of the molecular mechanisms for impairment of signal transduction cascades and gene expression during lymphocyte activation by drugs and chemicals.



Dr. James Luyendyk was named Albert C. Dehn and Lois E. Dehn Chair in Veterinary Medicine. Luyendyk is a professor in the Department of Pathobiology and Diagnostic Investigation, where his work focuses on identifying

novel mechanisms whereby the coagulation cascade contributes to liver disease pathogenesis.

CRIS Blog Topics

The Center for Research on Ingredient Safety continues to use their expert knowledge to research, fact check, and supply the global community with the latest science-based information about the ingredients in food, beverages and other consumer products. Here are some of CRIS's most recent blog post topics:

- » Everyday Toxicology: Reference Dose
- » Real-time Science: What's Plastic?
- » Real-time Science: Plastic & Polymer-based Packaging
- » Real-time Science: Biodegradable Plastics & Polymers
- » Alpha-Hydroxy Acids (AHA)
- » In the News: Heavy Metals in Spices
- » Trending: Lanolin
- » New Research: Pyrrolizidine Alkaloids
- » Trending: Sulfites
- » What's the Risk: Cannabidiol (CBD)
- » Trending: Mineral Sunscreen

Read more on all of these topics at: <https://www.canr.msu.edu/cris/news-views/>

For more information on the 2024 Investiture Ceremony, please see the original article on MSUToday: <https://msutoday.msu.edu/news/2024/recognizing-msu-endowed-outstanding-faculty>. ☘



Above: Instructors and graduate students participating in the Computational Systems Toxicology: Modeling and Informatics Workshop at MSU on May 6-9, 2024.

MSU SRC Hosts Computational Systems Toxicology: Modeling and Informatics Workshop

The MSU SRC recently hosted the Computational Systems Toxicology: Modeling and Informatics (CSTMI) Workshop on May 6 - 9, 2024 at the Food Safety and Toxicology Building on Michigan State's campus. Course instructors were **Sudin Bhattacharya** and **Rance Nault** from Michigan State University, Qiang Zhang from Emory University, and Eberhard Voit from the University of Texas at Dallas.

The CSTMI workshop was attended by 15 students and covered (1) dynamical systems modeling techniques for quantitative investigation of biological systems responses to perturbations at the cellular and tissue levels, and (2) analysis of high-dimensional -omics data toward classification of cell types, inference of biological pathways, and prediction of cellular outcome trajectories. Upon completion of the workshop, students will have learned:

- » Common network motifs in signal transduction and gene regulatory

networks that underlie cellular and physiological systems-level behaviors, including signal amplification, homeostasis, adaptation, threshold responses, binary fate decision-making, and biological rhythms.

- » Molecular feedback and feedforward circuits comprising genes and proteins that give rise to various dynamic and dose-response behaviors. Examples include cellular stress responses, differentiation, cell cycle dynamics, body-level regulation, and others.
- » Use of these simulation techniques for developing quantitative adverse outcome pathway (AOP) models to assist our understanding and prediction of nonlinear dose response behaviors to environmental toxicants and drugs, and to help bridge the in vitro to in vivo extrapolation (IVIVE) data gap in New Approach Methodologies (NAM).

- » Commonly used dimension reduction, visualization, clustering, and pseudo-time trajectory algorithms for -omics data. Examples include t-SNE, UMAP, Monocle, and RNA velocity methods for single-cell RNA-seq data analysis.

- » Basic programming skills in R.
- » Biological data storage, sharing and management.

The workshop comprised lectures and hands-on computer exercises in R and was a collaborative effort between the Computational Modeling Core, the Research Experience and Training Coordination Core, and the Data Management and Analysis Core of the MSU Superfund Research Center. 🌱

Recent EITS Graduates



Ankita Bhattacharya

Food Science and Human Nutrition
Mentor, Courtney Carignan

Dr. Ankita Bhattacharya received her Ph.D. after completing the dual major program in Food Science and Human Nutrition and Environmental Toxicology. Her dissertation was, “*Poly- and Perfluoroalkyl Substances (PFAS) Contaminated Soils, Uptake into Foods, and Human Exposure.*”

Bhattacharya has accepted a postdoctoral position at the U.S. Department of Agriculture,

Agricultural Research Service, in the Animal Metabolism, Agricultural Chemical Research Unit. Her work will focus on investigating harmful chemical residues in milk, meat, and eggs, primarily studying the ADME (Absorption, Distribution, Metabolism, and Excretion) of legacy and emerging chemicals like PFAS. This research aims to provide crucial data on residue accumulation and depuration rates, ultimately helping to ensure minimal consumer exposure to chemical residues in food and animal products.



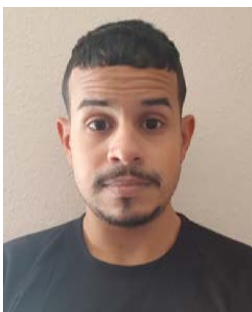
Sierra Boyd

Pharmacology and Toxicology
Mentor, Alison Bernstein

Dr. Sierra Boyd received her Ph.D. after completing the dual major program in Pharmacology and Toxicology and Environmental Toxicology. Her dissertation was, “*The effects of developmental exposure to the organochlorine pesticide dieldrin on susceptibility to Parkinson’s disease.*”

Boyd is now a postdoctoral researcher in the

laboratory of MSU alum Dr. Timothy Shafer at the U.S. EPA. Boyd was hired to develop new in vitro assays to study important aspects of neurodevelopment, like synaptic plasticity, using different electrophysiological endpoints. She will also work on developing high-throughput 3D culture models as well as using optogenetics to look at specific neuronal cell types and their roles in toxicity. This work will improve the ability of scientists to identify chemicals that may harm the developing brain and contribute to neurodevelopmental disease.



Luis Rivera-Cubero

Forestry
Mentor, David Rothstein

Dr. Luis Rivera-Cubero received his Ph.D. after completing the dual major program in Forestry and Environmental Toxicology. His dissertation was, “*Tree’s species effect on the deposition and transport of nutrients and pollutants in urban and rural midwestern forest.*”

Rivera-Cubero is currently a postdoctoral research associate for Corteva Agriscience focusing on environmental safety. Rivera-Cubero works on new approach methodologies in an environmental fate group where he studies the impacts of agrochemicals on soil health and soil microorganisms. He is also working on an ecotoxicology study which is investigating the impacts of agrochemicals on *Daphnia magna* by assessing their algae feeding intake.



Erin Zaluzec

Pharmacology and Toxicology
Mentor, Lorenzo Sempere

Dr. Erin Zaluzec received her Ph.D. after completing the dual major program in Pharmacology and Toxicology and Environmental Toxicology. Her dissertation was, “*Intraductal Delivery of an Ablative Agent as a Local Intervention for Breast Cancer Prevention In Rodent Models.*”

Currently, Zaluzec is a postdoctoral researcher at the University of Michigan under Dr. Erin Giles. The Giles laboratory focuses on integrative, translational approaches to study the impact of obesity

on metabolic health in pre-clinical models, with an emphasis on postmenopausal breast cancer. The research in the lab is currently focused on determining how inflammation in the visceral adipose tissue and tumor microenvironment link menopausal weight gain and subsequent breast cancer risk, and using diet, exercise, and pharmacological interventions to decrease these obesity-associated comorbidities after menopause.

Zaluzec is completing this research under the University of Michigan T32 training program, “Multidisciplinary Postdoctoral Training Program in Basic Diabetes Research.”



The IIT on Facebook

Did you know the IIT has a Facebook account? Keep up to date with seminar announcements, upcoming events and news links right from our page. When you visit, make sure to click “Like” so you don’t miss out on important IIT news!

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Lewandowski Receives 2024 Krehbiel Distinguished Staff Award from CVM

Ryan Lewandowski received the 2024 Krehbiel Distinguished Staff Award from the College of Veterinary Medicine. Lewandowski is the long-time manager of the Laboratory for Experimental and Toxicologic Pathology led by Drs. Jack Harkema and James Wagner. The Krehbiel Distinguished Staff Award, created by Dr. Janver and Mrs. Linda Krehbiel, is granted to a staff member who exemplifies excellence in overall job performance, and has outstanding interpersonal skills and working relationships that contribute to the overall climate, morale, and professionalism of their unit or department.

Thoughts from Dr. Jack Harkema:

Ryan has been an invaluable member of our laboratory and has contributed much to the overall success of our research program that involves primarily the study of respiratory pathology caused by the inhalation of xenobiotic agents such as environmental and occupational air pollutants (ozone, particulate matter, crystalline silica) and more recently SARS-CoV-2 coronavirus variants. For these federally funded, translational one-health research projects we have used a variety of laboratory mouse models of human/animal diseases such as asthma, acute/chronic respiratory disease syndromes (e.g., acute and

long COVID-19), type 2 diabetes, and systemic lupus erythematosus. With his wide-ranging expertise and experience in biomedical and environmental laboratory technology, Ryan has been a vital team member of our CVM laboratory and has contributed much to the work of our collaborators within and outside of CVM and MSU.

Besides handling routine laboratory operations such as ordering supplies and maintaining lab equipment, Ryan is responsible for four demanding technical work areas that include 1) operation and oversight of the CVM's digital whole glass slide scanner (Olympus VS200 Virtual Research Slide Scanner), 2) processing respiratory tissue for quantitative reverse transcription-polymerase chain reaction (qRT-PCR) or bulk tissue RNA-sequence analysis, 3) logistical oversight, operation and management of CVM/MSU's two mobile air research laboratories (AirCARE 1 and 2) for projects on campus and across the country (e.g., Michigan, New Mexico, Ohio, California), and 4) inventorying and processing fixed lung tissues from numerous collaborators (e.g., MSU, UNC-Chapel Hill, NCSU, WVU) for microscopic digital imaging and quantitative (morphometric) analysis. In addition, Ryan has excellent technical writing skills and has contributed as a co-author to



22 peer-reviewed publications from our laboratory. Furthermore, he continues his education and is enrolled in the MSU graduate school's Masters in Public Health program. He currently has a perfect 4.0 academic record.

Congratulations Ryan on this prestigious and well-deserved honor! 🎉

IIT Hosts Spring Seminars cont.

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ularly effects on infants and children following prenatal exposure, including susceptibility to respiratory infections and asthma. She is interested in nutritional interventions to reduce oxidative stress associated with maternal exposures to protect against these common childhood diseases. Johnson is the vice chair of the interdisciplinary program in Toxicology. She received her B.S. in biology and Ph.D. in toxicology from Texas A&M University. She completed a postdoctoral fellowship at Johns Hopkins University in environmental health sciences. Johnson spoke on, "Responding to Air Pollution in Disasters."

The final seminar of the series was given by Dr. Jason Richardson, Universi-

ty of Georgia, on April 9. Richardson is a Dianne Isakson Distinguished Professor in the Department of Physiology and Pharmacology and the Isakson Center for Neurological Disease Research. He spoke on, "Gene-Environment Interactions in Alzheimer's Disease: A Path to Precision Prevention and Treatment." Richardson's research uses translational approaches to examine the role of environmental chemical exposures and their interactions with genetic susceptibility as contributors to neurological disease.

The 3rd Annual Jerry Hook Distinguished Lectureship was given by Dr. Jeffrey M. Peters on May 21. Dr. Peters spoke on, "The Mechanisms of Peroxisome Proliferator-activated Receptor- α (PPAR α) Liver Carcinogenesis from Past to Present." Dr. Peters

is a Distinguished Professor of Molecular Toxicology and Carcinogenesis, and the Deputy Director of the Penn State Cancer Institute. His laboratory studies the role of the peroxisome proliferator-activated receptors (PPARs). PPARs modulate gene expression through direct and indirect mechanisms. His laboratory group uses genetically modified mouse and human models, high affinity agonists, antagonists and selective, repressive ligands to delineate the roles of PPARs, with a particular interest in cancers.

The IIT was excited to be able to offer such a diverse array of learning opportunities through the wide variety of seminars this spring. Look for the fall IIT Seminar Series schedule to be announced later this summer! 🎉



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