

# Global Metagenomics Summit



## MetaSUB Annual Meeting



Fontainebleau Miami Beach  
Miami, Florida, USA

Nov. 18-21, 2022

<http://metasub.org/2022-conference>



### Topics at the meeting will include:

- Global updates on metagenomic mapping of urban biomes and beyond
- Wastewater surveillance results, methods, and best practices
- Bioinformatics tools for patient and environmental sampling
- Microbial quantification, benchmarking, and variant tracking
- Ethical, legal, and social implications

### Keynote talks will include:

**Scott Gottlieb, MD**

Former Commissioner of the FDA,  
Senior Fellow at the American Enterprise Institute (AEI)

Presentation: *Advances in Cell Therapy & Uncontrolled Spread: Why COVID-19 Crushed Us and How We Can Defeat the Next Pandemic*



# Global Metagenomics Summit

## 7<sup>th</sup> Annual Metagenomics and Metadesign of Subways and Urban Biomes (MetaSUB) Conference

November 18 - November 21, 2022  
Miami Beach, Florida, USA  
[www.metasub.org/2022-conference](http://www.metasub.org/2022-conference)

### Agenda

#### Friday, November 18, 2022

**10:00 - 17:00**

#### Satellite Sessions

University of Miami - medical school campus (see appendix for details)

10:00-12:00

1. Field Demo of Wastewater Sample Collection and Processing  
*Jackson Hospital (sampling station WM08)*

13:00-15:00

2. Tour of the Sylvester Onco-Genomics Shared Resource and Biospecimen Shared Resources

*PAP Bldg (Papanicolaou Bldg) (48 on the map),  
1550 NW 10th Ave, Miami, FL 33133, Room 437*

15:00-17:00

3. Workshop on Metagenomic Analysis with MetaSUB CAMP

*Don Soffer Clinical Rsch Bldg (CRB) (19 on the map),  
1120 NW 14th ST, Miami, FL 33136, Room 1179*

**18:00 - 19:00**

#### Meeting Registration

Ocean Lawn, Fontainebleau Miami Beach hotel  
4441 Collins Ave, Miami Beach, FL 33140, USA

**18:00 – 22:00**

#### Opening Reception

Ocean Lawn, Fontainebleau Miami Beach hotel  
*Music, drinks and hors d'oeuvre*  
*\*Registration for this event is required*

## Saturday, November 19, 2022

7:30 – 8:30

### Breakfast & Meeting Registration

*Flicker Ballroom atrium, Fontainebleau Miami Beach hotel*

8:30 – 9:00

### Opening Remarks and Welcome

Christopher E. Mason, Ph.D.  
*Professor of Physiology and Biophysics, Weill Cornell Medicine  
Director, The WorldQuant Initiative for Quantitative Prediction  
Director and Founder, MetaSUB*

George S. Grills  
*Associate Director, Shared Resources  
Sylvester Comprehensive Cancer Center  
Miller School of Medicine, University of Miami*

### Plenary Session I

*Moderator:* Christopher E. Mason, Professor, Weill Cornell Medicine

9:00 – 9:30

### Interrogating the Intersection of Microbial Evolution and Human Health at Humanity's Greatest Frontiers

Braden Tierney, Ph.D.  
*Postdoctoral Fellow, Weill Cornell Medicine & Harvard Medical School  
Director of Bioinformatics, MetaSUB*

9:30– 10:00

### Microbial Species Richness in Tropospheric Samples Above the Planetary Boundary Layer Confirms Long-Distance Transport of Potential Human Pathogens

Xavier Rodó, Ph.D.  
*ICREA Research Professor and Program Lead,  
Barcelona Institute for Global Health*

10:00 – 10:30

### Biosurveillance in the 21st Century: A Modern Data Stack for Global Public Health

James Golden, Ph.D.  
*Vice President, Pandemic Prevention Institute  
The Rockefeller Foundation (Diamond Sponsor)*

10:30 – 11:00

### Genomics, Metabolomics, and In-depth Analysis of Wastewater

Mariana Matus, Ph.D.  
*CEO, Biobot (Silver Sponsor)*

11:00 - 11:30

### Break and Visit with Sponsors

11:30 – 12:30

### Lightning Talks (Round 1)

*See appendix for speakers*

12:30 – 13:30

### Poster Session and Lunch

*See appendix for list of poster presentations*

## **Plenary Session II**

*Moderator:* Braden Tierney, Director of Bioinformatics, MetaSUB, Weill Cornell Medicine

- 13:30 – 14:00**            **Fine-scale, Antimicrobial Resistance Gene Transfer Maps**  
Eran Elhaik, Ph.D.  
*Associate Professor of Biology*  
*Lund University*
- 14:00 – 14:30**            **The GeoSeq Platform for Mapping Species Around the World**  
David Danko, Ph.D.  
*Chief Technology Officer*  
*Biotia (Platinum Sponsor)*
- 14:30 – 15:00**            **Break and Visit with Sponsors**
- 15:00 – 15:30**            **MetaAir Initiative Status Report 2017-2022**  
Orr Russell, Ph.D.  
*Senior Researcher*  
*Norwegian Defense Research Establishment*
- 15:30 – 16:30**            **Lightning Talks (Round 2)**  
*See appendix for speakers*
- 16:30 - 16:35**            **Closing Remarks (Day 1)**
- 16:35 - 18:00**            **Beach Volleyball: Wet Lab vs. Dry Lab**  
*South Beach Volley - Indian Beach Park*  
*3 minute walk from the Fontainebleau Miami Beach*  
*Meet at the Ocean Lawn by 16:35*
- 19:30 – 21:30**            **Dinner (on your own)**

## Sunday, November 20, 2022

**7:30 – 8:45**                    **Breakfast & Meeting Registration**  
*Flicker Ballroom atrium, Fontainebleau Miami Beach hotel*

**8:45 – 9:00**                    **Opening Remarks**  
Christopher E. Mason, Ph.D.  
*Professor, Weill Cornell Medicine*  
*Director, MetaSUB & The WorldQuant Initiative for Quantitative Prediction*

### **Plenary Session III**

*Moderator:* George Grills, Associate Director, University of Miami

**9:00 – 9:30**                    **Cell Programming, Genome Editing, and Virus Hunting**  
Keith Robison, Ph.D.  
*Principal Scientist*  
*Ginkgo Bioworks (Silver Sponsor)*

**9:30 – 10:00**                    **Genomic Epidemiology Outbreak Investigations in Broadway Theaters**  
Blythe Adamson, PhD, MPH  
*Director of Quantitative Sciences at Flatiron Health*

**10:00 – 10:30**                    **Viral Source Tracking: Down to a Single Toilet**  
Marc Johnson, PhD  
*Associate Professor of Molecular Microbiology and Immunology,*  
*University of Missouri*

**10:30 – 11:00**                    **Break and Visit with Sponsors**

### **Keynote Presentation**

*Moderator:* Christopher E. Mason, Professor, Weill Cornell Medicine

**11:00 – 12:00**                    **Advances in Cell Therapy & Uncontrolled Spread: Why COVID-19 Crushed Us and How We Can Defeat the Next Pandemic**  
Scott Gottlieb, MD  
*Former Commissioner of the FDA,*  
*Senior Fellow at the American Enterprise Institute (AEI)*

**12:00 – 13:00**                    **Lunch and Book Signing**  
**with Dr. Scott Gottlieb & Dr. Christopher Mason**  
*Uncontrolled Spread: Why COVID-19 Crushed Us and How We Can Defeat the Next Pandemic, by Dr. Scott Gottlieb*  
  
*The Next 500 Years: Engineering Life to Reach New Worlds, by Dr. Christopher Mason*

## **Plenary Session IV**

*Moderator:* Krista Ryon, Executive Director of MetaSUB, Weill Cornell Medicine

Introduction by Dr. Helena Solo-Gabriele:

- 13:00 – 13:15**            **The New View of Public Health**  
Erin Kobetz, Ph.D., MPH  
*Vice Provost for Research and Scholarship*  
*Associate Director, Population Science and Cancer Disparities*  
*Sylvester Comprehensive Cancer Center*  
*Professor of Medicine and Public Health Sciences*  
*Miller School of Medicine, University of Miami*
- 13:15 – 13:45**            **Building the World's Largest Phage-Host Atlas Using Proximity Ligation Technology**  
Ivan Liachko, Ph.D.  
*CEO, Phase Genomics (Gold Sponsor)*
- 13:45 – 14:15**            **Detecting, Understanding, and Mitigating Microbiome Biases**  
*Braden Tierney, PhD*  
*Postdoctoral Assoc., Weill Cornell Medicine & Harvard Medical School*  
*Director of Bioinformatics, MetaSUB*  
*Affiliate of Zymo Research (Platinum Sponsor)*
- 14:15 – 14:45**            **Emerging techniques in microbiome research and wastewater surveillance**  
Heather Martinez, PhD  
*Sr. Manager, ThermoFisher Scientific (Platinum Sponsor)*
- 14:45 – 15:15**            **Break and Visit with Sponsors**
- 15:15 – 15:45**            **Lessons from Extremophiles**  
Scott Tighe  
*Lead, UVM Integrative Genomic Facility*  
*University of Vermont*
- 15:45 – 16:15**            **From the Earth Microbiome to the Global Virome**  
Nikos C. Kyrpides, PhD  
*Senior Scientist, Joint Genome Institute (JGI)*
- 16:15 – 16:45**            **Standards for Microbiome Measurements**  
Scott Jackson, PhD  
*Group Leader, Complex Microbial Systems*  
*National Institute of Standards and Technology (NIST)*

**16:45 – 17:15**

**Data Standards and Informatics Infrastructure to Facilitate Effective Surveillance of COVID-19 Outbreaks: Towards a Global Alert and Response Network**

Stephan Schürer, Ph.D.  
*Associate Director, Data Sciences  
Sylvester Comprehensive Cancer Center  
Professor of Molecular and Cellular Pharmacology  
Miller School of Medicine, University of Miami*

**17:15 – 17:25**

**Closing Remarks** (Day 2)

**18:00 – 22:00**

**Social Event: Sunset Cruise with Dinner and Dancing**

*Biscayne Lady yacht leaves from Eden Roc Marina harbor  
45th Street and Collins Ave, Miami Beach, FL 33140, USA  
(near the Fontainebleau Miami Beach hotel)  
Boarding from 18:00 - 18:30  
\*Registration for this event is required*



## Monday, November 21, 2022

- 7:30 – 8:00**                    **Breakfast & Meeting Registration**  
*Flicker Ballroom atrium, Fontainebleau Miami Beach hotel*
- 8:00 – 8:05**                    **Opening Remarks**  
George S. Grills  
*Associate Director, Shared Resources  
Sylvester Comprehensive Cancer Center  
Miller School of Medicine, University of Miami*
- 8:05 – 8:15**                    **NIH RADx-rad Wastewater Detection of SARS-COV-2 Initiative**  
Tamara Slipchenko, Ph.D.  
*Program Officer, NIH/NIDA*
- 8:15 – 8:45**                    **Reflections from RADx-rad Wastewater-based Epidemiologic Studies and Potential Future Directions**  
Helena Solo-Gabriele, Ph.D., P.E.  
*Professor, Department of Chemical, Environmental and Materials Engineering  
University of Miami*

### Plenary Session V

*Moderator:* Helena Solo-Gabriele, Professor, University of Miami

- 8:45 – 9:15**                    **The CDC COVID Data Tracker: Variant Surveillance**  
Rory Welsh, Ph.D.  
*Lab Lead, National Wastewater Surveillance System (NWSS)  
Waterborne Disease Prevention Branch  
Centers for Disease Control and Prevention (CDC)*
- 9:15 – 9:45**                    **Miami Health Engineering Initiative and Airborne Transmission of Viruses and Risk Reduction with Personal Sampling**  
Pratim Biswas, Ph.D.  
*Professor of Chemical, Environmental, and Materials Engineering  
and of Atmospheric Sciences  
Dean, College of Engineering  
University of Miami*
- 9:45 – 10:00**                    **Utility of Wastewater-Based Epidemiology to Detect Multiple Human Pathogens**  
Mark Sharkey, Ph.D.  
*Assistant Professor of Medicine, Division of Infectious Diseases  
Miller School of Medicine, University of Miami*



- 10:00 - 10:15**      **Environmental SARS-CoV-2 and COVID-19 Prediction at Local, Regional, and National Scales**  
Naresh Kumar, M.D.  
*Associate Professor of Environmental Health  
Miller School of Medicine, University of Miami*
- 10:15 - 10:45**      **Wastewater Sampling in Schools: New Strategies in Creating a Culture of Safety**  
Lisa Gwynn, DO, MBA, MSPH, FAAP  
*Associate Professor of Clinical Pediatrics and Public Health Sciences  
Section Chief, Pediatric Primary Care  
Medical Director, Pediatric Mobile Clinic and School Health  
Miller School of Medicine, University of Miami*
- 10:45 – 11:15**      **Coffee Break & Visit with Sponsors**
- 11:15 – 11:45**      **A Comparison of Adsorption-Extraction and Nanotrap Magnetic Virus Particles to Recover Endogenous SARS-CoV-2 and Pepper Mild Mottle Virus from Wastewater**  
Aaron Bivins, Ph.D.  
*Assistant Professor of Civil and Environmental Engineering  
Louisiana State University*
- 11:45 – 12:15**      **Detection and Identification of COVID-related Antibodies in Wastewater**  
Cynthia Gibas, PhD  
*Professor, Bioinformatics and Genomics  
University of North Carolina at Charlotte*  
  
Marie Agan, Lecturer, Norwich University
- 12:15 – 12:45**      **Ethics, Philosophy, and Environmental Surveillance**  
Kenneth Goodman, Ph.D., FACMI, FACE  
*Director, Institute for Bioethics and Health Policy (Silver Sponsor)  
Professor of Medicine  
Miller School of Medicine, University of Miami*
- 12:45 – 13:30**      **Sewers, Subways, and Space Stations: Genetic Maps of Earth's Cities and Beyond**  
Christopher E. Mason, Ph.D.  
*Professor, Weill Cornell Medicine  
Director, The WorldQuant Initiative for Quantitative Prediction  
Founder and Director, MetaSUB*
- 13:30 – 13:45**      **Closing Remarks (Day 3)**
- 13:45 – 14:00**      **Lunch (Grab & Go)**

## **Appendix**

### **Satellite Sessions**

There will be three satellite sessions on the University of Miami Miller School of Medicine campus on Friday, November 18, 2022, prior to the start of the conference at the Fontainebleau Miami Beach. Attendees can sign up for the satellite sessions when registering for the conference.

Bus transportation between the university and the hotel will be provided. Campus maps will be provided to attendees, and student and staff volunteers will be on-site to guide attendees to the sessions' locations.

**9:00 - 9:15**

**Board bus at hotel**

*Meet outside of front lobby entrance of Fontainebleau Miami Beach hotel  
"Academy" bus departs at 9:15*

**9:15 - 9:45**

**Travel:** bus ride from hotel to University of Miami medical campus

**10:00 - 12:00**

**Satellite Session 1:**

**Field Demonstration of Wastewater Sample Collection and Processing**

Helena Solo-Gabriele, Ph.D., P.E.

*Professor, Department of Chemical, Environmental and Materials Engineering  
University of Miami*

**Location: Jackson Hospital sampling station WM08**

**12:00 - 13:00**

**Lunch (on your own)**

**13:00 - 15:00**

**Satellite Session 2:**

**Tour of the Sylvester Onco-Genomics Shared Resource and Sylvester Biospecimen Shared Resources**

Sion Williams, Ph.D.,

Director, Onco-Genomics Shared Resource

Sylvester Comprehensive Cancer Center

Miller School of Medicine, University of Miami

Melinda Boone,

Assistant Director of the Biospecimen Shared Resource

Sylvester Comprehensive Cancer Center, University of Miami

**Location: PAP Bldg (Papanicolaou Bldg) (48 on the map),  
1550 NW 10th Ave, Miami, FL 33133, Room 437**

**15:00 - 17:00**

**Satellite Session 3:**

**Workshop on Metagenomic Analysis with the MetaSUB Core Analysis  
Modular Pipeline (CAMP)**

Braden Tierney, Ph.D.

Postdoctoral Assoc., Weill Cornell Medicine & Harvard Medical School  
Director of Bioinformatics, MetaSUB

Lauren Mak

Ph.D. Candidate, Weill Cornell Medicine

**Location: Don Soffer Clinical Rsch Bldg (CRB) (19 on the map),  
1120 NW 14th ST, Miami, FL 33136, Room 1179**

**17:15 - 17:30**

**Board bus at University of Miami medical campus**

Meet at front of *Don Soffer Clinical Rsch Bldg (CRB) (19 on the map),  
1120 NW 14th ST, Miami, FL 33136,*  
“Academy” bus departs a 17:30

**17:30 - 18:00**

**Travel:** bus ride from University of Miami medical campus to hotel

## Lightning Talks

### (Round 1)

Title	Speaker
Inactivation of antibiotic resistant bacteria and elimination of transforming ability of plasmid carrying single and dual drug resistance genes by electro-oxidation using Ti/Sb-SnO <sub>2</sub> /PbO <sub>2</sub> anode	Indumathi Nambi, PhD
Quantifying shared and unique gene content across 17 microbial ecosystems	Samuel Zimmerman
The things I do for reproducibility: quantifying measurement error in metagenomics data	Lauren Mak
Supervised Machine Learning Enables Geospatial Microbial Provenance	Chandrima Bhattacharya
Metagenomics profiling of fermentation microbial ecology	Folarin Oguntoyinbo, PhD
Multi-omics integration of skin spatial transcriptomics, metagenomics, and metatranscriptomics changes during spaceflight	Jiwoon Park
UArizona Research on Wastewater-based Epidemiology: Success and Challenges	Walter Betancourt, Ph.D.

### (Round 2)

Title	Speaker
From MetaSUB&CAMDA to real life applications: looking for microbial synergies and exploiting forensic potential of microbiome	Paweł Łabaj, PhD
K-mer based approach for forensic applications of Microbiomics: predicting the origin of the sample.	Michał Kowalski
Temporal, geographic, and population patterns of SARS-CoV-2 variants detected in wastewater samples across Atlanta, GA, October 2021-April 2022	Christine Moe, PhD
Unimizers: a Novel Approach to Alignment of Low-Complexity Genomic Sequences.	Kirill Grigorev
Whole-genome and metagenomic sequencing of wastewater surveillance: SARS-CoV-2 and beyond	Rachel Poretsky, PhD

Synergies - a key to investigate closely-related ecological niches (Virtual)	Dagmara Błaszczyk
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## Poster Presentations

### Poster Session I

Saturday, Nov. 19, 2022, : 12:15 – 12:45

Presenter	Title
Dusica Vidovic, PhD <i>University of Miami</i>	SF-RAD Data Standards and Informatics Infrastructure to Support Data Collection, Harmonization, and Sharing for Effective Surveillance of COVID-19 Outbreaks
Kristina Babler, MSc <i>Department of Chemical, Environmental, and Materials Engineering, College of Engineering, University of Miami</i>	DNA Isolation from Wastewater: Experimentation from a SARS-CoV-2 Optimized Workflow
George Grills <i>Sylvester Comprehensive Cancer Center, University of Miami</i>	The Role of Shared Resources in Facilitating Human and Environmental Surveillance for SARS-CoV-2
Naresh Kumar, MD <i>University of Miami</i>	Environmental SARS-CoV-2 and COVID-19 prediction at local, regional and national scales
Erik Lamm <i>University of Miami</i>	Associations of Water Quality and Flow with SARS-CoV-2 RNA Levels in Wastewater
Maria Sierra <i>Weill Cornell Medicine</i>	Diversity of Lake Hillier Australia reveals pigment-rich polyextremophiles and wide-ranging metabolic adaptations
Timothy Read, PhD <i>Emory University</i>	Using Bactopia for highly scalable, portable and customizable bacterial genome analyses
Sergios-Orestis Kolokotronis, PhD <i>SUNY Downstate Health Sciences University</i>	Urban metagenomics in the Anthropocene: Bioremediation and biomining potential of a Superfund site in New York City

### Poster Session II

Saturday, Nov. 19, 2022, : 12:45 – 13:15

Presenter	Title
Michał Kowalski, MSc <i>Małopolska Centre of Biotechnology, Jagiellonian University</i>	K-mer based approach for forensic applications of Microbiomics: predicting the origin of the sample.
Samantha Abelson <i>University of Miami</i>	Influence of Meteorological Conditions and Water Characteristics on SARS-CoV-2 Concentration in Wastewater
Nitesh Sharma, PhD <i>University of Southern California</i>	Genomic-based SARS-CoV-2 wastewater surveillance: challenges, approaches and opportunities
JangKeun Kim, PhD <i>Weill Cornell Medicine</i>	Inspiration4: Comprehensive and Integrative Single Cell Multi-omics Analysis of the Immune System of SpaceX Inspiration4 Mission Crews
Samuel Zimmerman <i>Harvard University</i>	Quantifying shared and unique gene content across 17 microbial ecosystems

Collette Thomas & Matthew Roca <i>University of Miami</i>	Wastewater-Based Epidemiology as a Strategy for Tracking and Tracing COVID-19 on a University Campus
Ayaaz Amirali <i>University of Miami</i>	Understanding the Influence of COVID-19 Testing Intensity on Wastewater-Based Epidemiology through Quantitative Analysis
Krista Ryon <i>Weill Cornell Medicine</i>	MetaSUB and it's journey from subways to global pathogen surveillance

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