Biobot Analytics

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NASEM Workshop Series: Expanding MCM Delivery & Public Private Partnerships

Dr. Mariana Matus

Wastewater intelligence to save lives

Newsha Ghaeli
President & Cofounder

Background:
Architecture & Engineering
MIT Research Fellowship on
smart city technologies

Mariana Matus, PhD
CEO & Cofounder

Background:
Computational Biology &
Microbiology
MIT PhD dissertation on
wastewater epidemiology

Our data helped the Town of Cary decrease overdoses by 40% in in 2018

Bloomberg Philanthropies MAYORS CHALLENGE

"By having this data, we were able to go out and do 50-some interviews and presentations, and talk to our community about what is going on in our neighborhoods, in our neighbors homes."

- Mike Bajorek, Deputy Town Manager
Cary, North Carolina

Link to video interview

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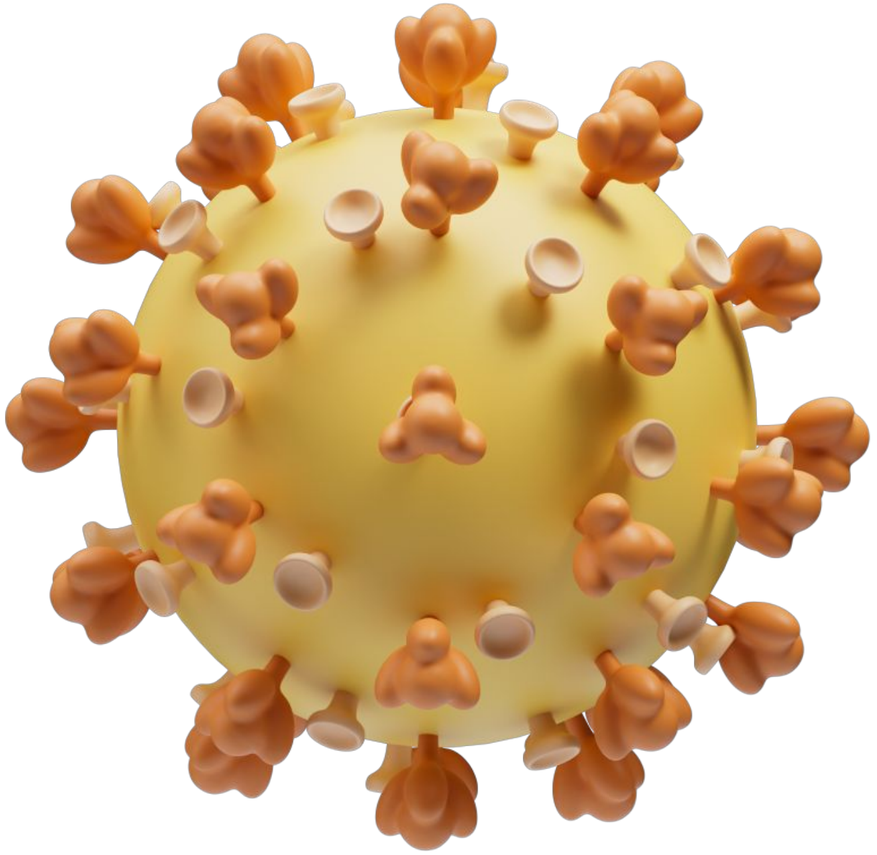


Biobot first reported the detection/quantification of SARS-CoV2 in wastewater, via partnership with a local WWTP

Throughout North America, Biobot has been a trusted partner of:

Federal

CDC — Centers for Disease Control and Prevention

Department of Defense — United States of America

NIH National Institute on Drug Abuse — Advancing Addiction Science

State

Commonwealth of Massachusetts — Department of Public Health

Department of Health and Human Services — Virginia

pennsylvania — Department of Health

Universities

Rollins — EST. 1885

UMass Dartmouth

Local

CITY of BOSTON

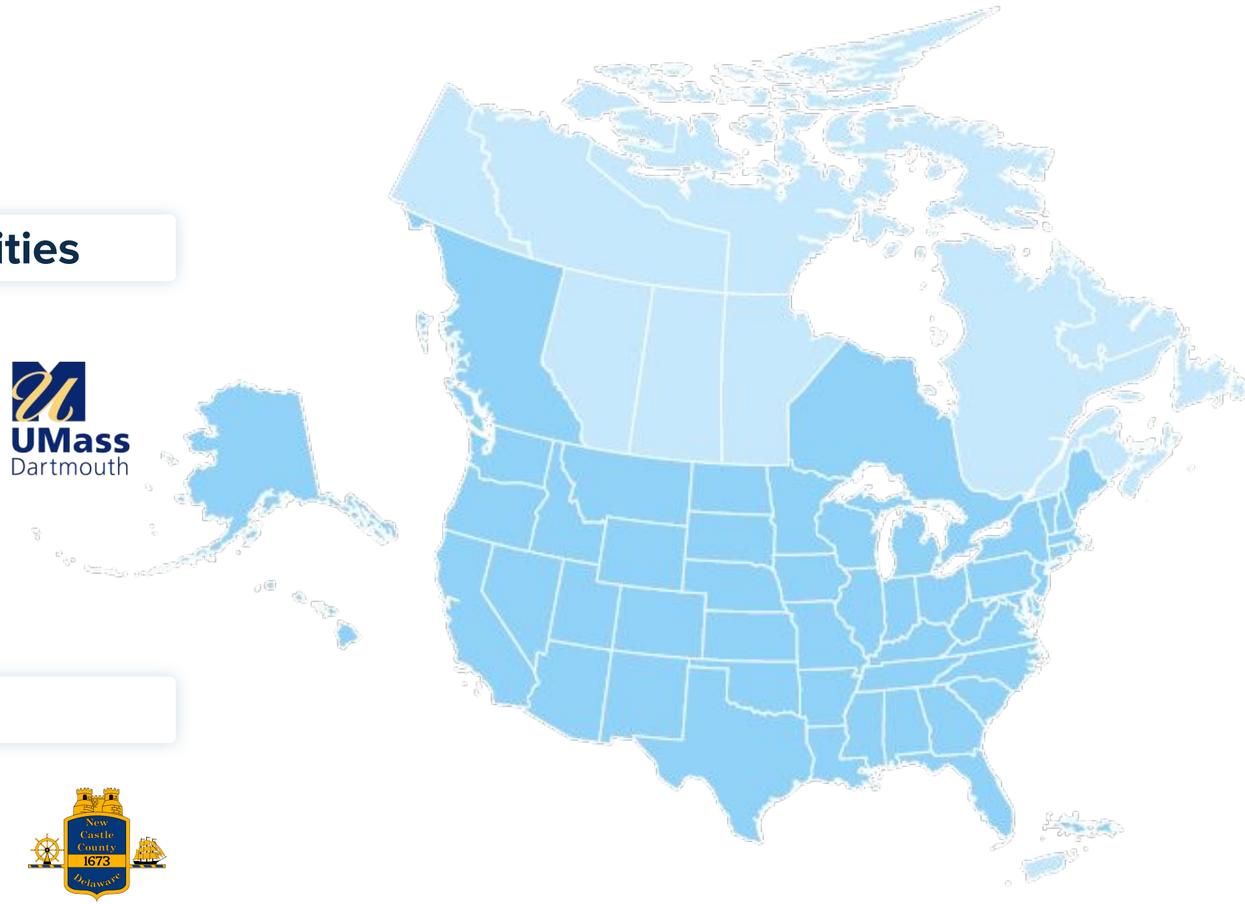
Montgomery County — Pennsylvania

County of Marin

Miami-Dade County

United States Virgin Islands — St Croix · St John · St Thomas

New Castle County — 1673 — Delaware



50+ states, territories, provinces

100,000+ samples tested

>40% of U.S. population

1,000+ sampling locations in database

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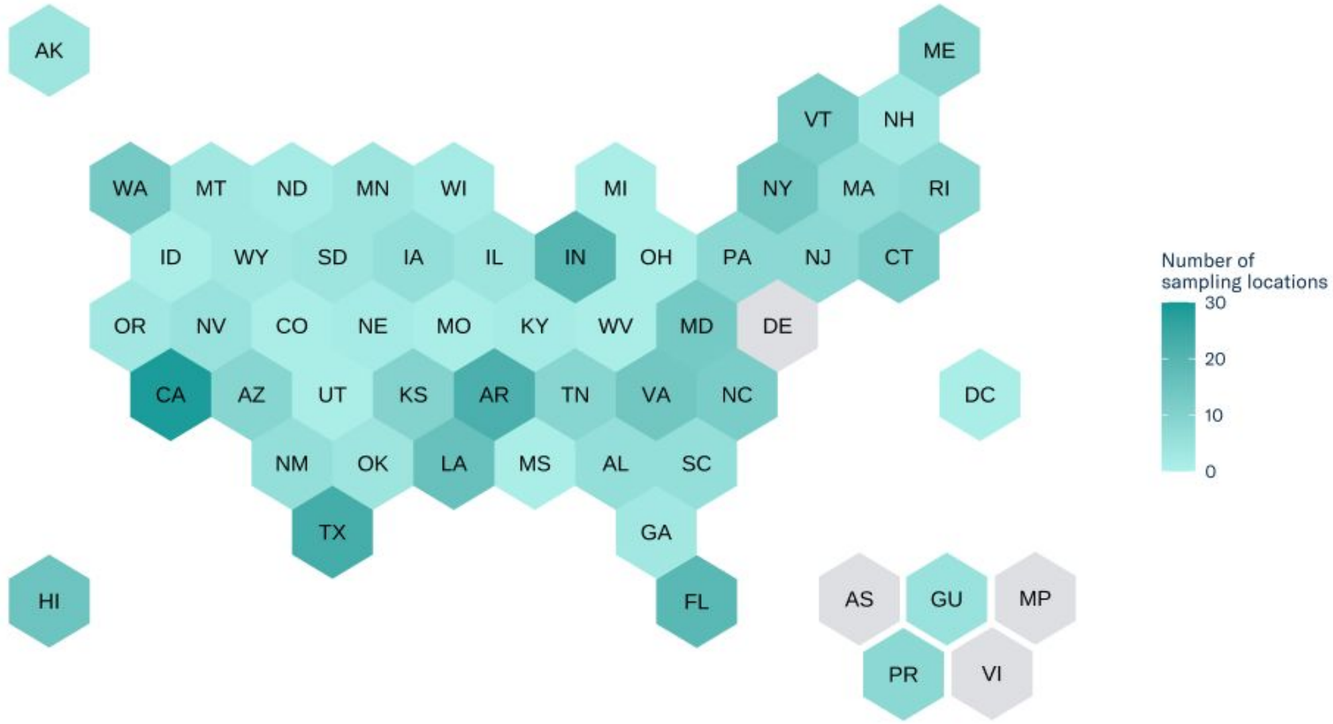
Bringing Public/Private Partnerships Is Critical In Protecting Communities

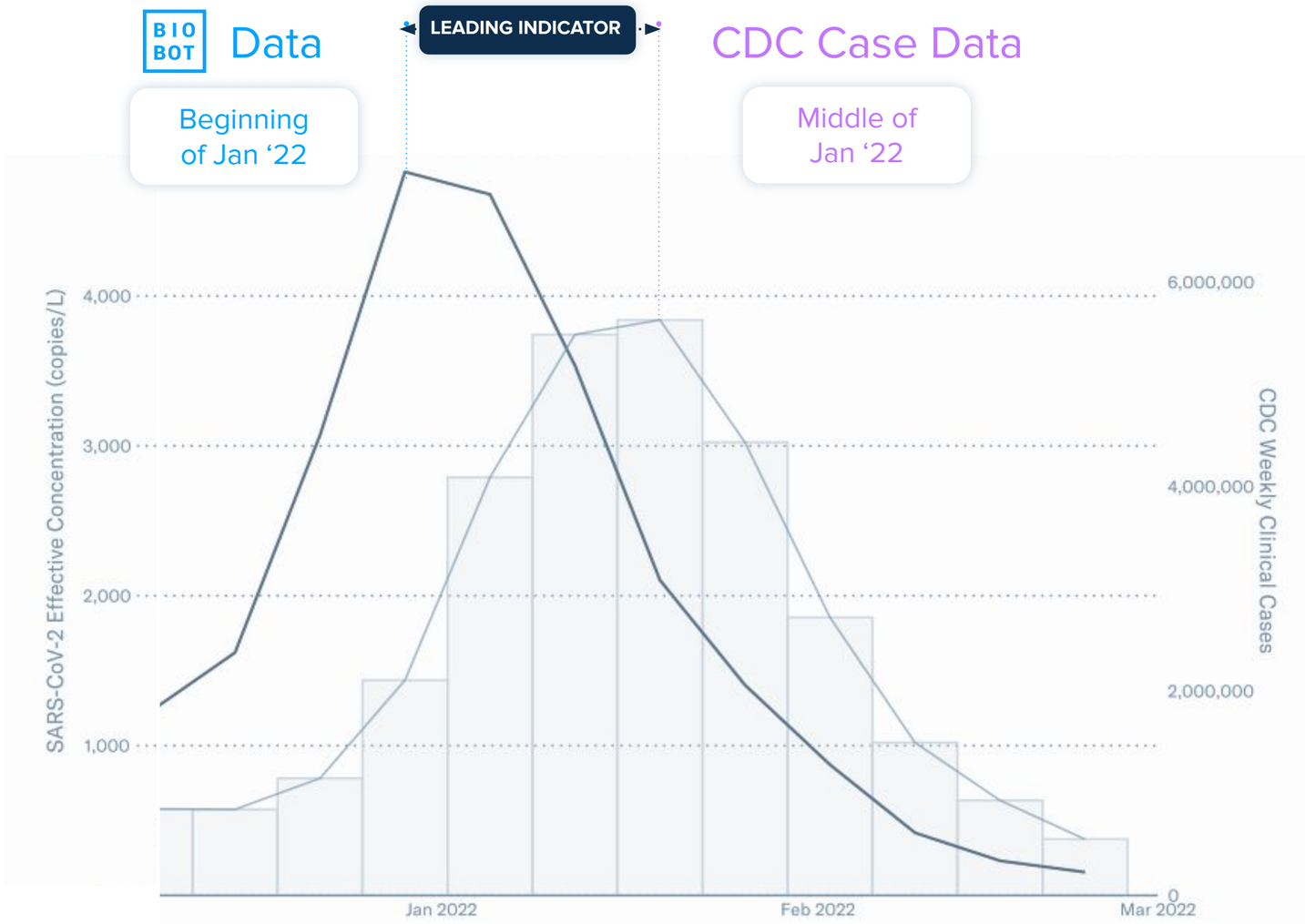
- Disease surveillance in the U.S. is **fragmented**
  - Onus is on individual states to track and report cases and testing
- **Public/private partnerships** can help combat patchwork of surveillance systems in the U.S.
  - Especially true with new technologies such as wastewater-based epidemiology
- In 2021, Biobot partnered with **HHS** to monitor for SARS-CoV-2 at **335 sites**, covering over **90 million people**
- In 2022, Biobot partnered with **CDC NWSS** to monitor for SARS-CoV-2 and mpox at **369 sites,** covering over **60 million** people



This chart depicts all locations that have provided samples to Biobot Analytics for participation in NWSS

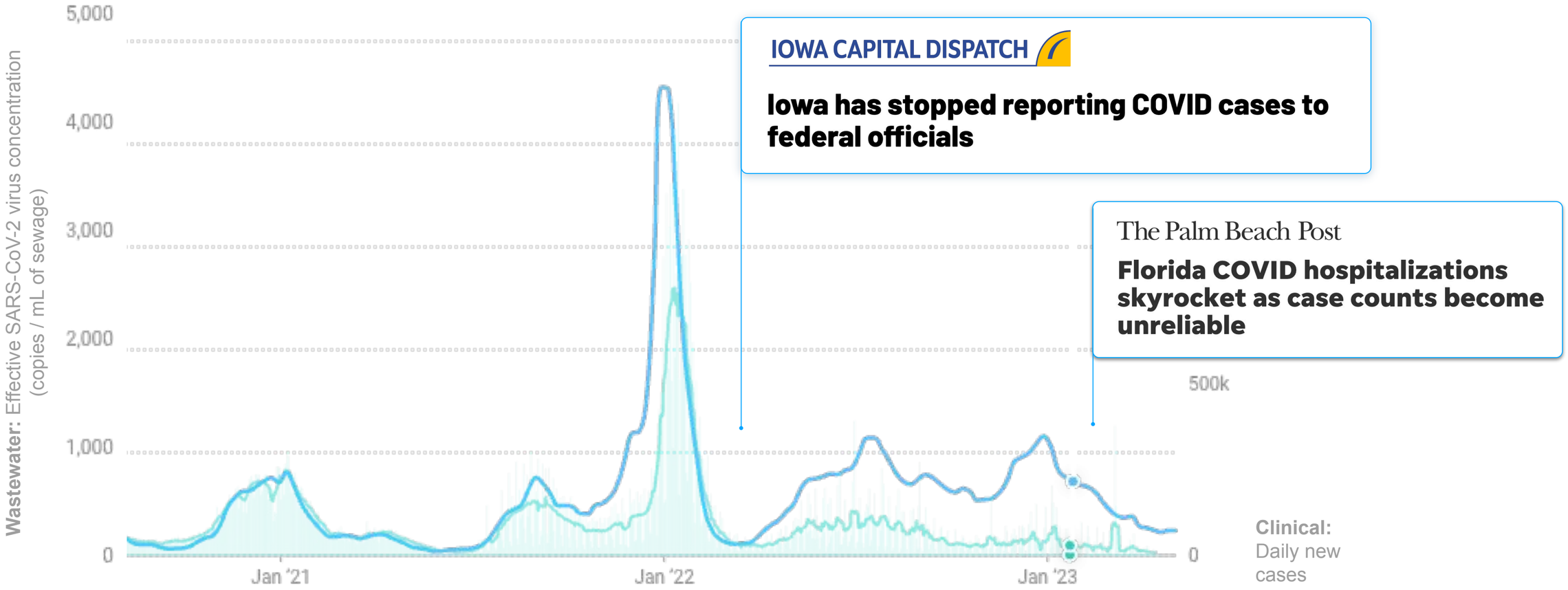
NATIONAL ™ WASTEWATER SURVEILLANCE SYSTEM

When clinical data was robust, wastewater was a leading indicator of clinical cases



Omicron showed up in wastewater before symptoms led individuals to get clinically tested, if they chose to do so at all.

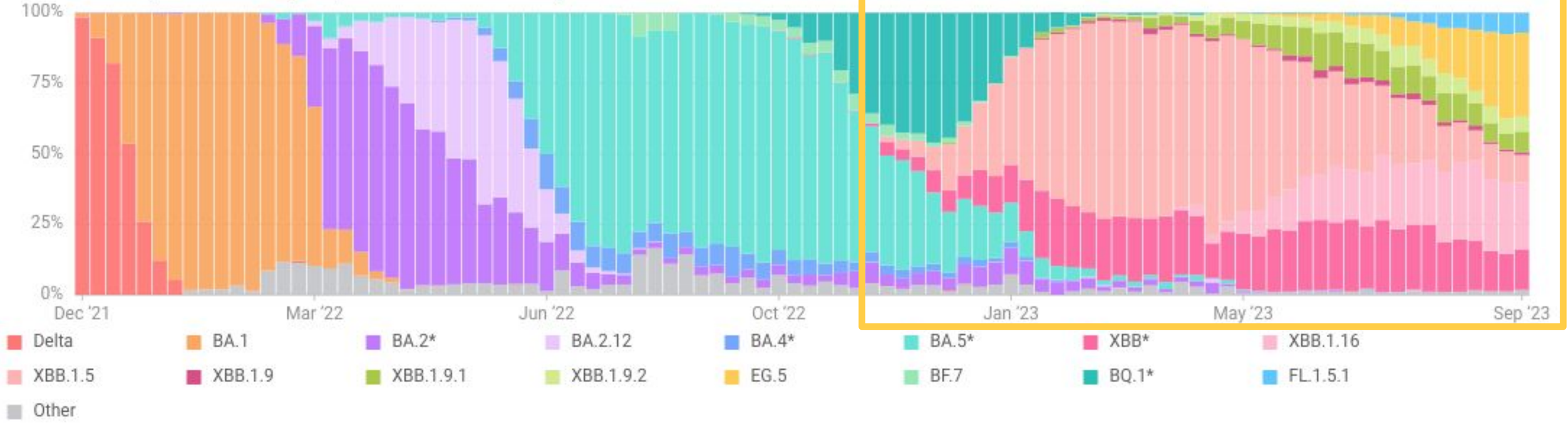
As clinical data becomes less readily available, wastewater has become a more reliable source of disease prevalence



Nationwide variant data show takeover of XBB* this winter

Nationwide Midwest Northeast South West

Variants: Percentage of variant lineage sequenced from SARS-CoV-2 genome found in wastewater



Source: Wastewater data from Biobot Analytics *More details at Covid-19 Variant Report notes.

> About the data

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Bringing Public/Private Partnerships Is Critical In Protecting Communities

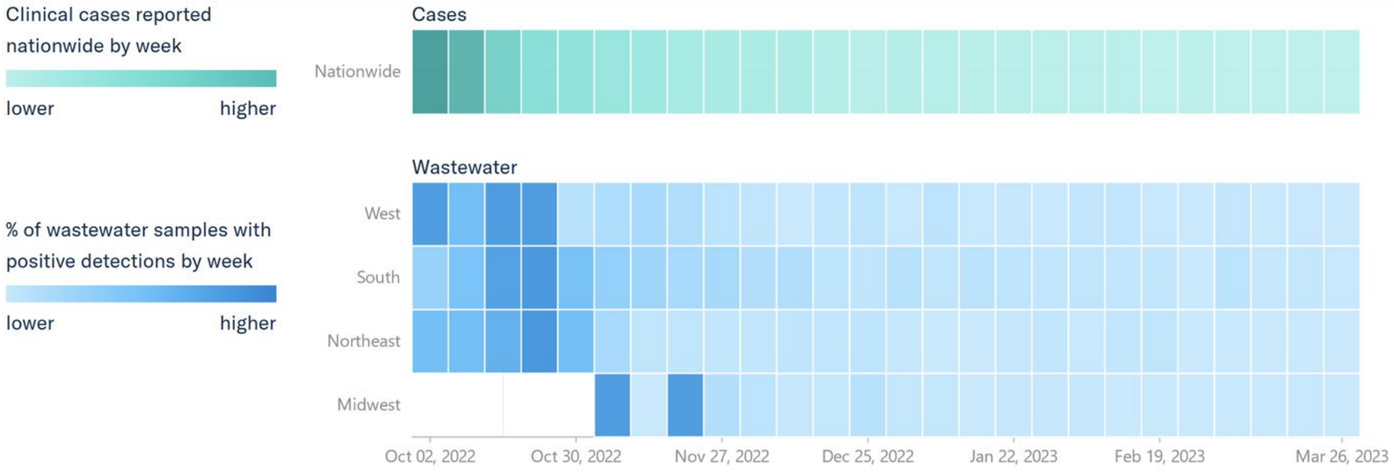
In May 2022, the WHO and CDC declared an outbreak of mpox virus a global public health emergency.

We didn't know where in the US mpox was spreading.

- ➔ Testing required special labs, making it very challenging.
- ➔ There was stigma around testing.

Centers for Disease Control and Prevention

Working quickly in collaboration with the CDC, Biobot developed an mpox assay



Mpox virus has been detected in wastewater **days before** cases are identified.

Early wastewater signals enable public health to take action.

- Obtaining additional testing supplies
- Alerting clinicians them to look for signs of mpox in their patients,
- Disseminating public health messaging to communities

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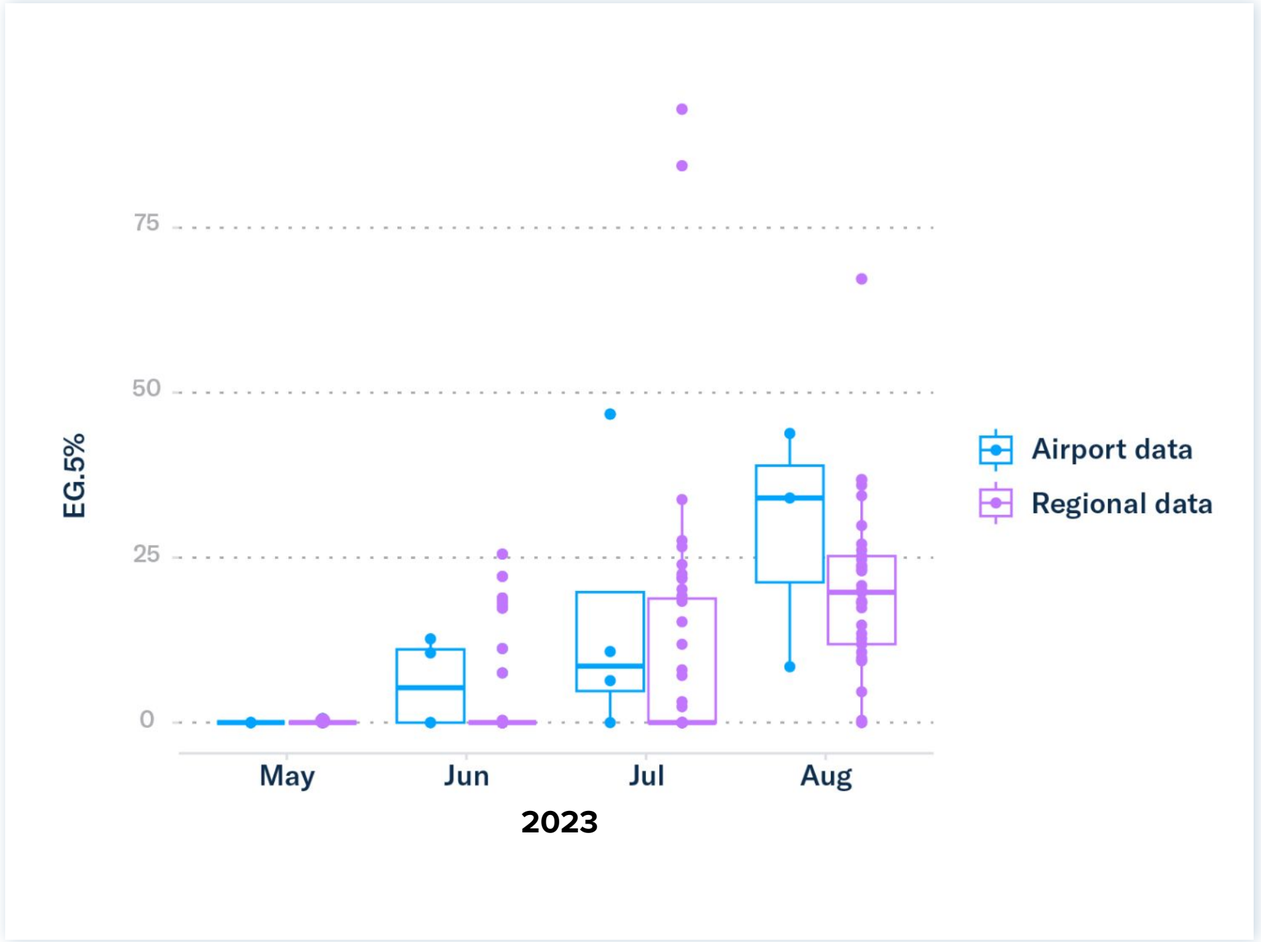
Airport wastewater data is a leading indicator for the rise of the EG.5 variant



Biobot Analytics Awarded NIDA Funding for Nationwide Wastewater-Based Monitoring Program for High Risk Substances and Others Associated with Health Risks

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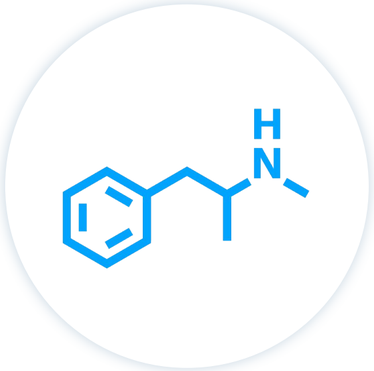
This initiative aims to better understand substance use and misuse at a national level

Building MCM agnostic technologies

Agnostic Technologies

Metagenomics



High-resolution
Mass Spectrometry

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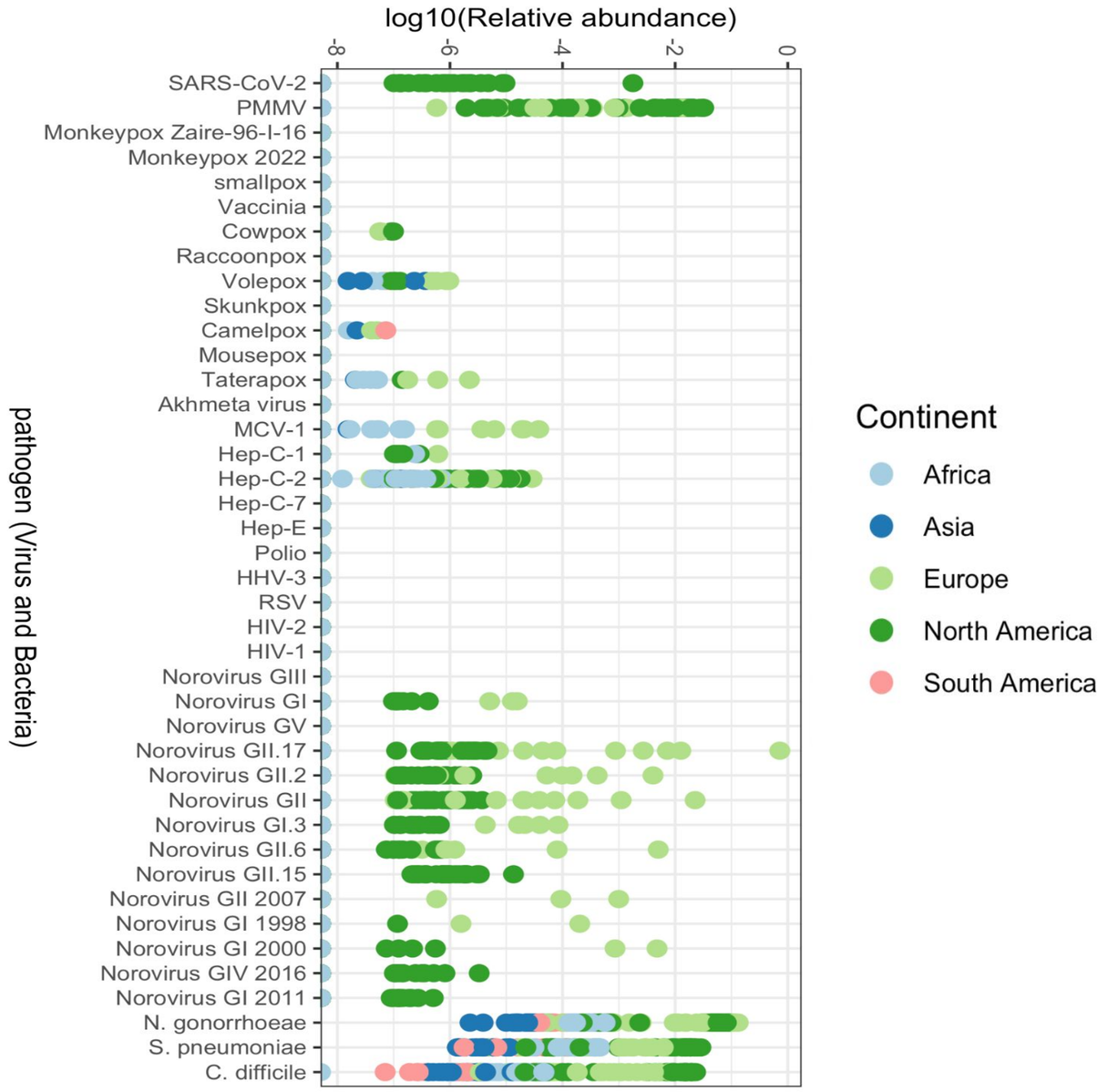
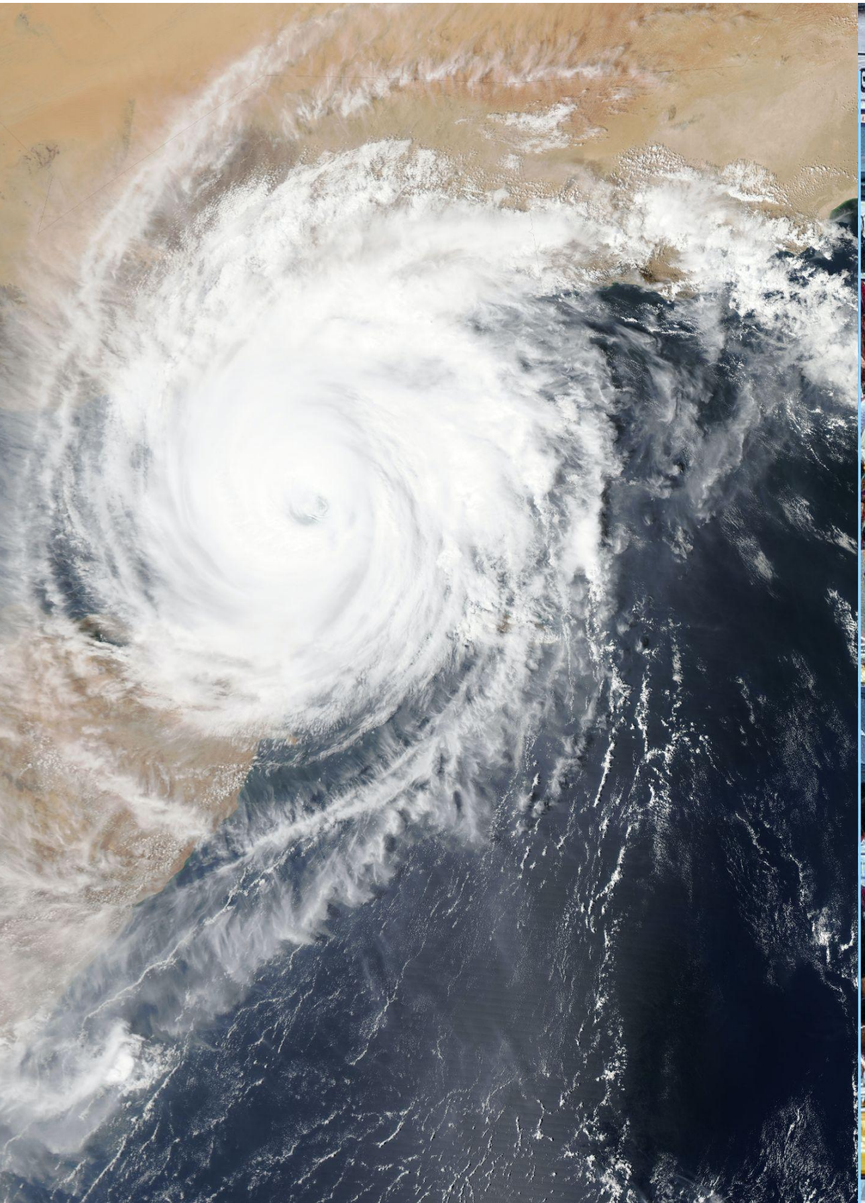
Survey of raw pathogen abundances

- Wide variety of viral and bacterial pathogens can be detected in wastewater
- Lack of correlation between abundances and expected geographic distributions indicate that careful QC and refinement is required to develop an effective surveillance tool.



Monumental societal shifts make now the time to scale



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Questions?

Mariana Matus, PhD

CEO & Cofounder

Mariana@biobot.io