

# Mpox surveillance in the EU/EEA

# Outline – Part 1

This session consists of the following elements

1. Mpox surveillance
2. Epidemiology
3. Risk assessment & recommendations

# Mpox surveillance in the EU/EEA

# How ECDC monitors mpox

## Indicator based surveillance

- EpiPulse Cases → EU/EEA

## Event based surveillance

- Screening and early detection activities through Epidemic Intelligence (24/7)
- Assessment and discussion at the daily Round Table meetings

## Early Warning is also ensured through

- EWRS → EU/EEA
- WHO IHR notifications → Global level

# ECDC Mpox related outputs

- Monthly report
- Communicable disease threat report (CDTR)
- Risk assessments
- Threat assessment brief



THREAT ASSESSMENT BRIEF

## Detection of autochthonous transmission of monkeypox virus clade Ib in the EU/EEA

24 October 2025

### Summary

This Threat Assessment Brief aims to assess the risk of autochthonous transmission of monkeypox virus (MPXV) clade Ib in EU/EEA countries in the context of male-to-male sexual transmission. It is intended for public health authorities in EU/EEA countries and is based on currently available evidence. It therefore carries considerable uncertainty. Recommendations how public health authorities can respond at the country level together with an overview of knowledge gaps in the context of MPXV clade Ib are also included.

**Epidemiological situation**

- On 10 October 2025, Spain reported its first locally acquired clade Ib mpox case. On 17 October, four additional clade Ib mpox cases were reported to ECDC among males without travel history by Italy (two), Portugal (one) and the Netherlands (one). All five cases had mild symptoms. Some of the individuals reported having sexual contact with another male.
- These recent cases, where there is no travel history, represent a different pattern of transmission and indicate that transmission may be occurring in sexual networks among men who have sex with men in several EU/EEA countries. The 30 clade I mpox cases reported in the EU/EEA previously were all imported or had clear links to imported cases.

**Risk assessment**

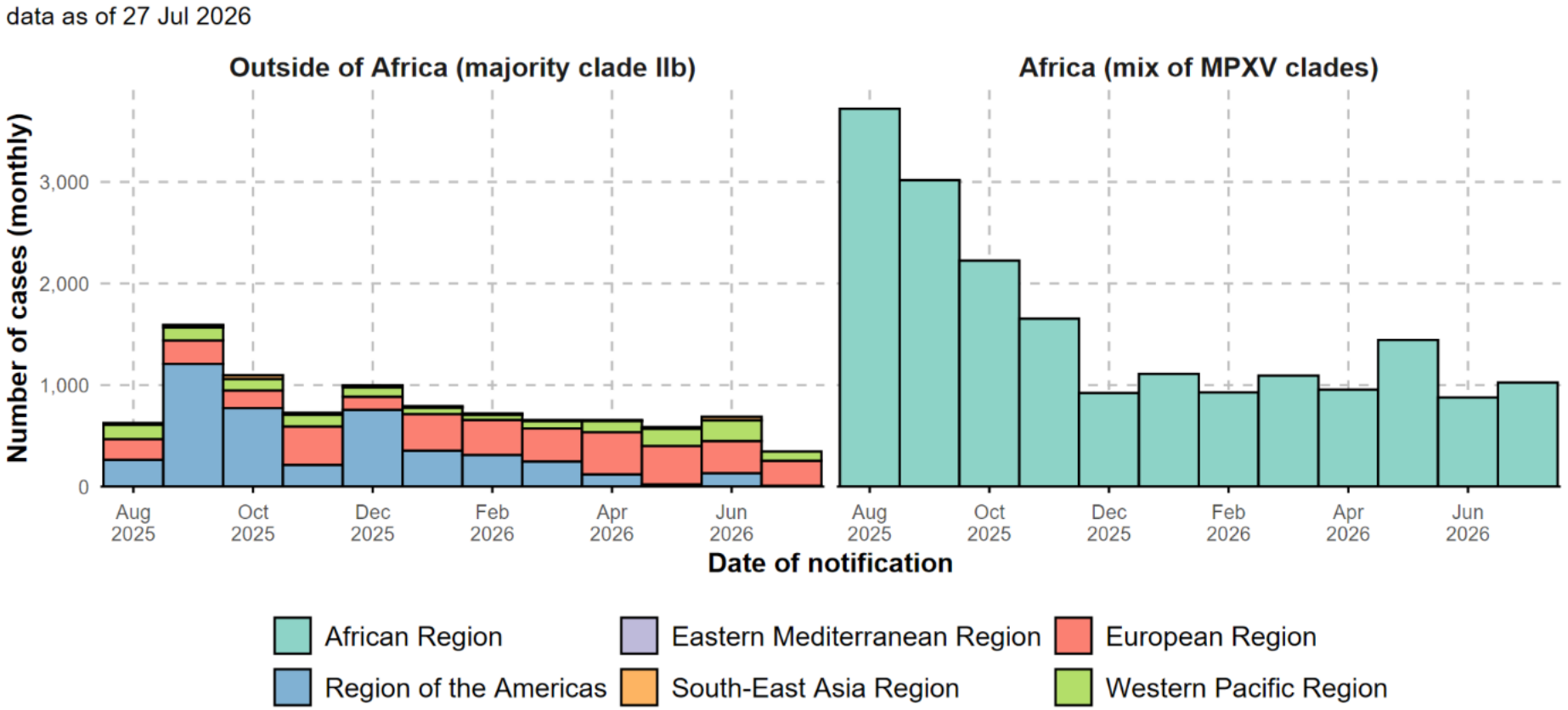
- Based on current evidence, the overall risk of MPXV clade Ib infection is assessed as moderate for men who have sex with men and low for the general population.
- It is likely that further cases are present among men who have sex with men in the EU/EEA but have not yet been detected. ECDC will continue to closely monitor and review this risk assessment should the situation evolve into a larger outbreak.

**Recommendations**

- EU/EEA countries should ensure laboratory testing is easily accessible, particularly in locations that serve men who have sex with men, and that clinicians and laboratories can report cases to public health authorities rapidly.
- Identifying clades should be done where individuals have been diagnosed with mpox, and clade I viruses should be sequenced as soon as possible.

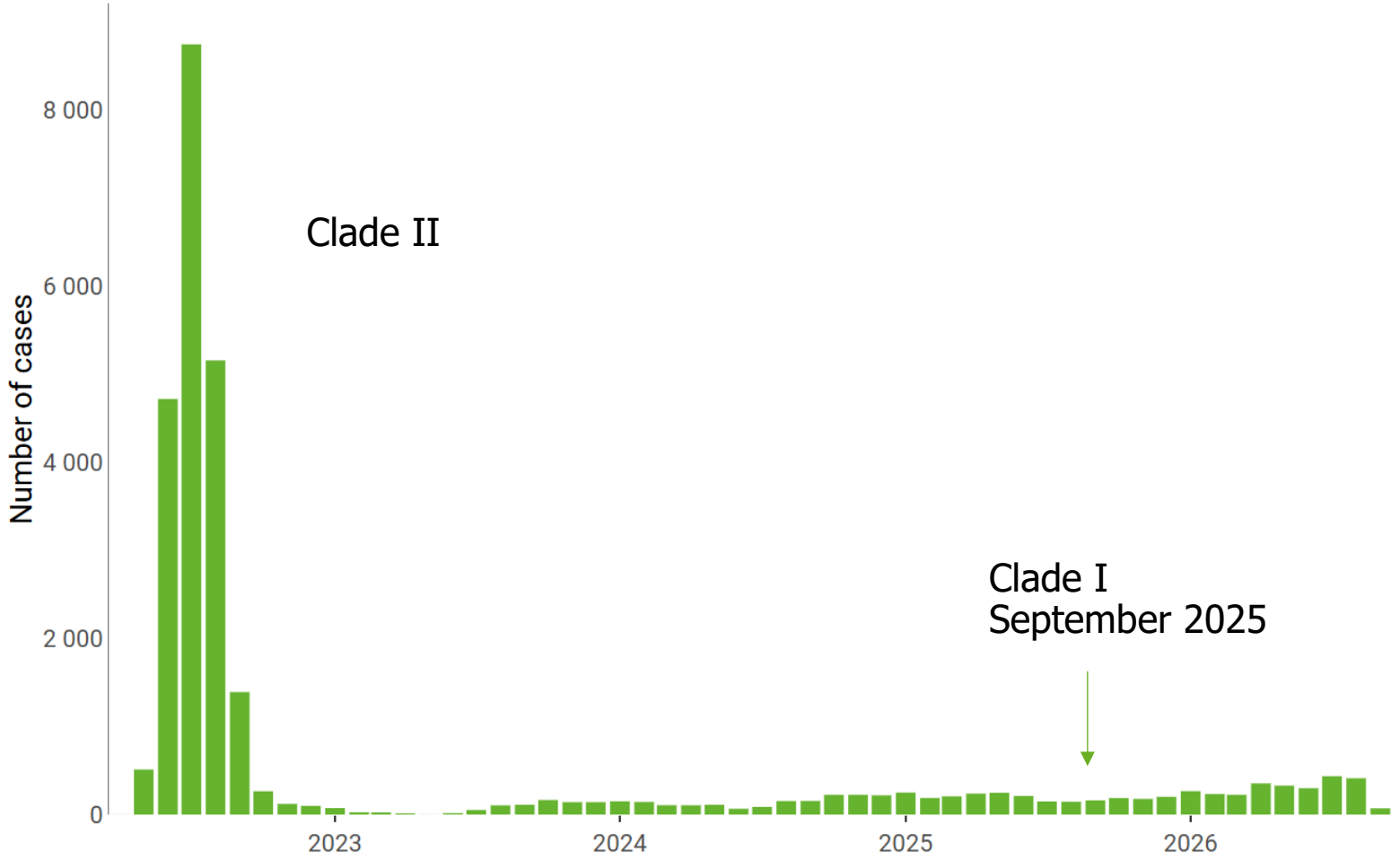
# Epidemiology

# Reported confirmed mpox cases, by WHO region, by month, 1 August 2025 – 31 July 2026



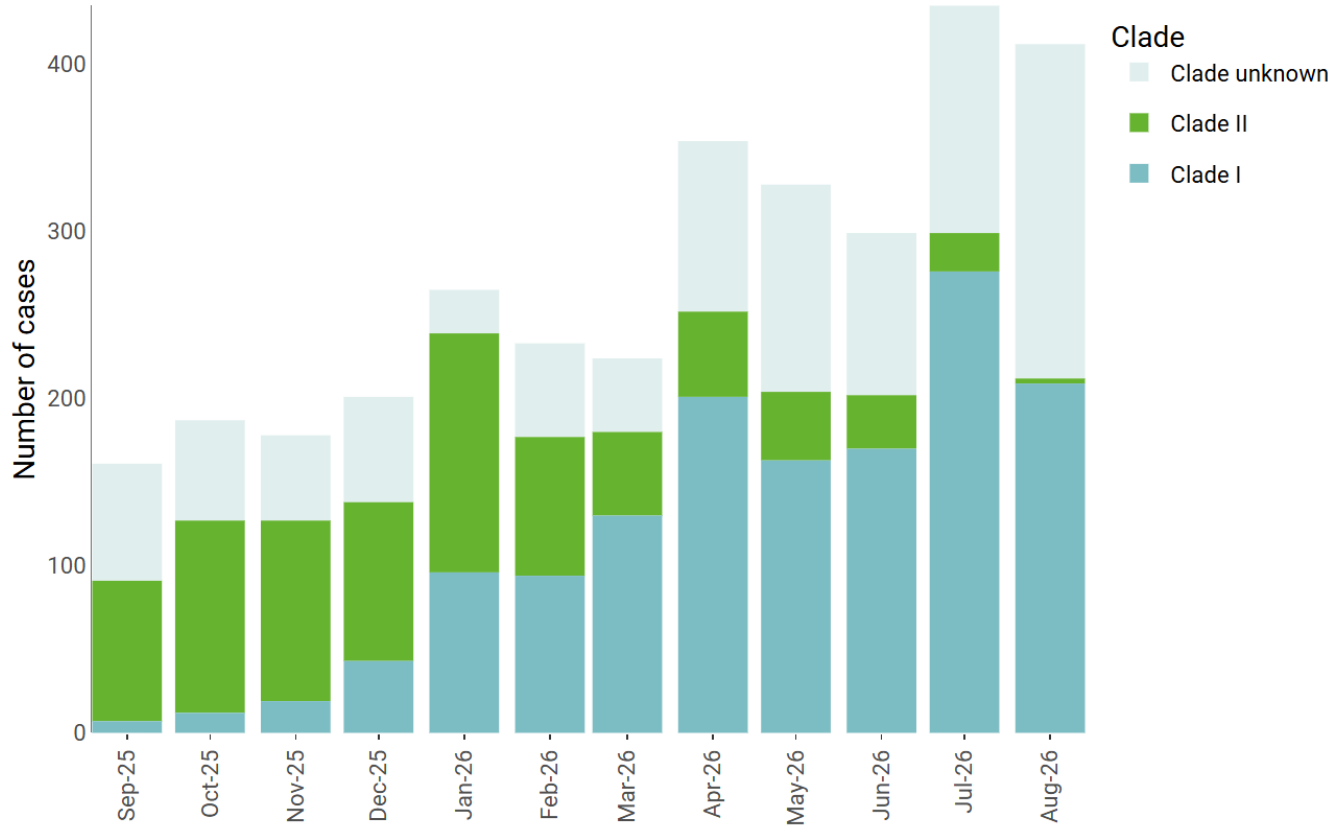

Source: multi-country-outbreak-of-mpox--external-situation-report_69.pdf

# Reported mpox cases – all clades – from January 2022 and as of 15 September 2026, EU/EEA




Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

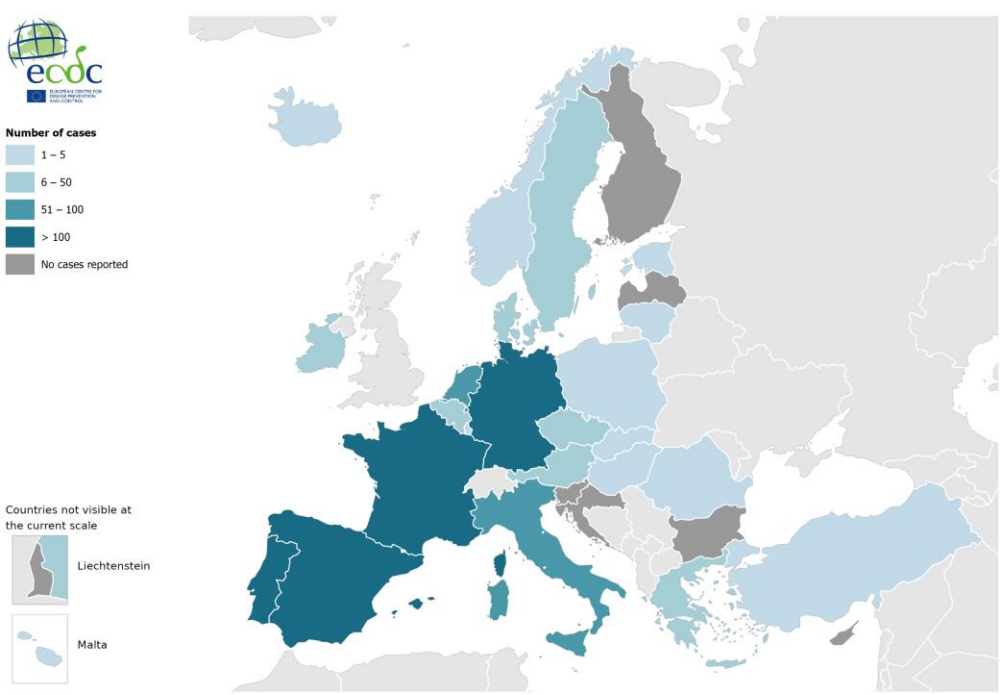
# Reported mpox cases by clade and month of diagnosis, 1 September 2025 – 31 August 2026, EU/EEA



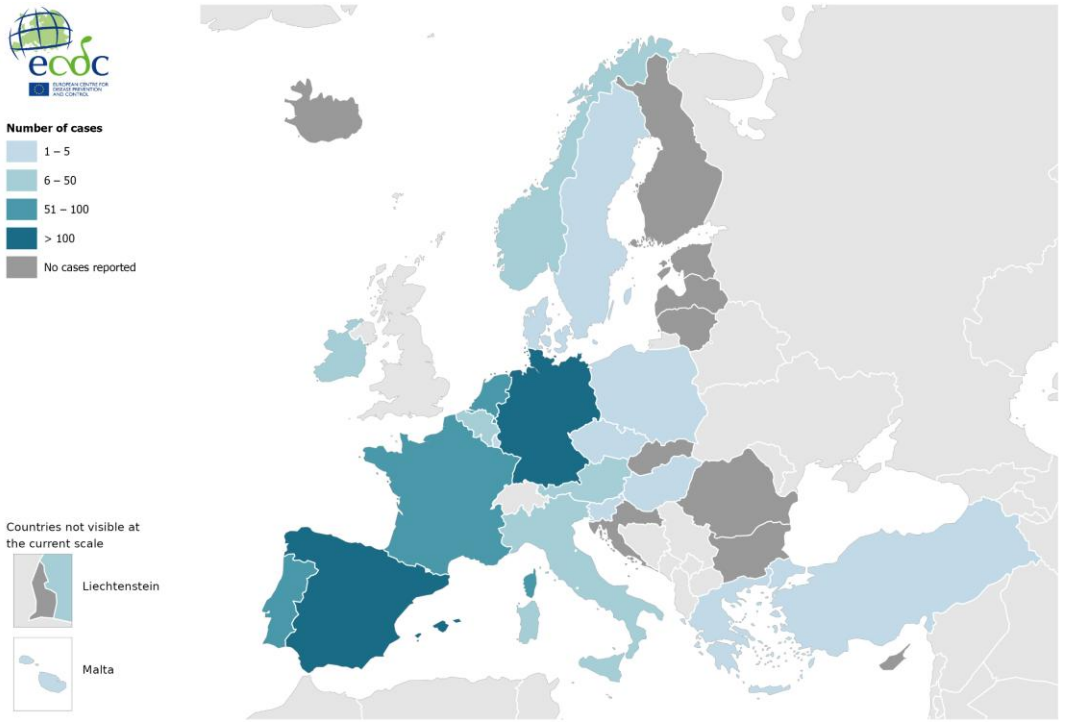

Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

# Mpox cases by clade, 1 September 2025 – 31 August 2026, EU/EEA and the Western Balkans and Türkiye

## Clade I




## Clade II




Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

# Mpox cases by sexual behaviour reported in people aged 15 years and above, 1 September 2025 – 31 August 2026, EU/EEA*

| Sexual behaviour | Clade I | | Clade II | |
|---|---|---|---|---|
| | Number | % (column)[#] | Number | % (column)[#] |
| Men who have sex with men | 877 | 90.4% | 598 | 90.3% |
| Heterosexual | 75 | 7.7% | 55 | 8.3% |
| Bisexual | 16 | 1.6% | 9 | 1.4% |
| Other | 2 | 0.2% | 0 | 0.0% |
| **Total** | **970** | **100.0%** | **662** | **100.0%** |

[#]Percentages exclude observations with missing data on sexual behaviour. Missing for clade I = 438 (31.1%); clade II = 156 (19.0%).

[*]Excludes cases with missing age.

Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

# Mpox cases by hospitalisation status, 1 September 2025 – 31 August 2026, EU/EEA

| Hospitalisation status | Clade I | | Clade II | |
|---|---|---|---|---|
| | Number | % (column)[#] | Number | % (column)[#] |
| Hospitalised | 158 | 11.9% | 67 | 8.3% |
| Not hospitalised | 1 171 | 88.1% | 743 | 91.7% |
| **Total** | **1 329** | **100.0%** | **810** | **100.0%** |

[#]Percentages exclude observations with missing data on hospitalisation. Missing for clade I = 91 (6.4%); clade II = 18 (2.2%).

Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

# Mpox cases in EU/EEA by vaccination status, September 2025 – August 2026

| Vaccination status | Clade I | | Clade II | |
|---|---|---|---|---|
| | Number | % (column)[#] | Number | % (column)[#] |
| Not vaccinated | 508 | 70.7% | 299 | 72.2% |
| Vaccinated with one dose | 50 | 7.0% | 29 | 7.0% |
| Vaccinated with two doses | 152 | 21.1% | 76 | 18.4% |
| Vaccinated but number of doses unknown | 9 | 1.3% | 10 | 2.4% |
| **Total** | **719** | **100.0%** | **414** | **100.0%** |

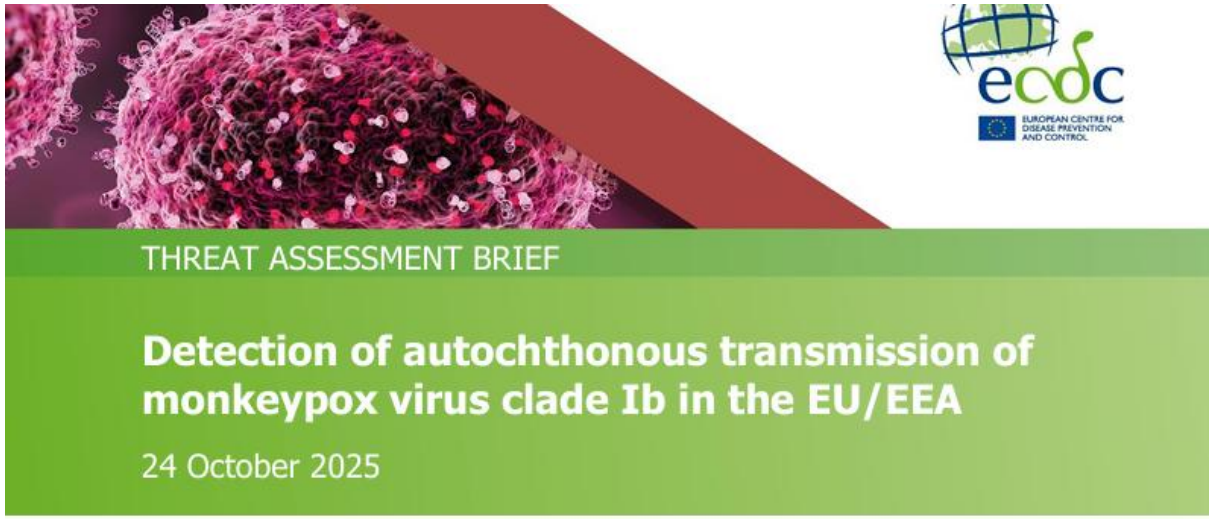
[#]Percentages exclude observations with missing data on vaccination. Missing for clade I = 701 (49.4%); clade II = 414 (50.0%).

Source: Surveillance of mpox in the European Union/European Economic Area (EU/EEA) – Monthly report, August 2026

# Risk assessment & recommendations

# Assessment

- Ongoing transmission of mpox across the EU/EEA.
- The overall risk of MPXV clade Ib infection:
  - **moderate** for **men who have sex with men**
  - **low** for **the general population**.
- Prior mpox infection and vaccination are expected to reduce the likelihood of infection and severity of disease.



THREAT ASSESSMENT BRIEF

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24 October 2025

## Summary


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**Risk assessment**

- Based on current evidence, the overall risk of MPXV clade Ib infection is assessed as moderate for men who have sex with men and low for the general population.
- It is likely that further cases are present among men who have sex with men in the EU/EEA but have not yet been detected. ECDC will continue to closely monitor and review this risk assessment should the situation evolve into a larger outbreak.

**Recommendations**

- EU/EEA countries should ensure laboratory testing is easily accessible, particularly in locations that serve men who have sex with men, and that clinicians and laboratories can report cases to public health authorities rapidly.
- Identifying clades should be done where individuals have been diagnosed with mpox, and clade I viruses should be sequenced as soon as possible.

# Recommendations for EU/EEA countries

- Increase vaccination uptake
- Strengthen community engagement and risk communication
- Ensure accessible testing and rapid reporting
- Enhance case detection and public health response
- Maintain strong surveillance
- Continue clade identification and genomic sequencing



Bridging the gaps in Bioinformatics

# Genomic surveillance of mpox virus (MPXV)

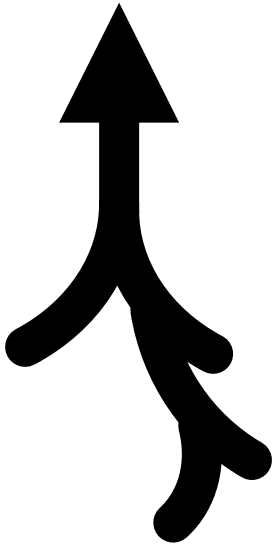
Priyanka Nannapaneni

# Outline – Part 2

This session consists of the following elements

- Why genomic surveillance?
- Data sharing and sequence inputs
- Analysis workflow
- Visualization and interpretation
- Applications in public health
- Conclusions

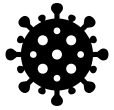
# A new paradigm: integrated surveillance



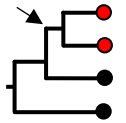
- It **is a coordinated approach** to disease monitoring that combines multiple sources of data, laboratory methods, and disciplines to provide a **comprehensive** picture of public health threats.

- *bioinformatics, data science, microbiology, epidemiology, epidemic intelligence, health economics, behavioural science*

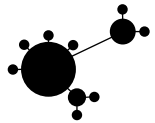
# Added value of genomic surveillance



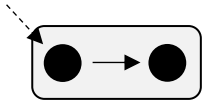
Classification beyond clades and lineages



Emergence dating and circulation timeline



Genetic linkage / transmission chain reconstruction



Epidemiological context (importation, local transmission)

# Recommendations for sequence sharing

- ECDC recommends MS to share the WGS data to open databases – NCBI GenBank/SRA, Pathoplexus and GISAID EpiPox
- In addition, they have possibility to share the sequences to ECDC to EpiPulse Events as well as sharing via email to Microbiology inbox

# Methods used for sequence analysis

- Nextstrain pipeline - [nextstrain/mpox: Nextstrain build for mpox virus]
- **Modifications made to the Nextstrain pipeline –**
  - Appending GISAID data to input in addition to Pathoplexus data
  - When applicable, masking sites adapted from **WHO International Pathogen Surveillance Network (IPSN)** ([WHO-Collaboratory/collaboratory-mpox-genomics-phylomasking])

README | Code of conduct | Contributing | MIT license

## Nextstrain repository for mpox virus

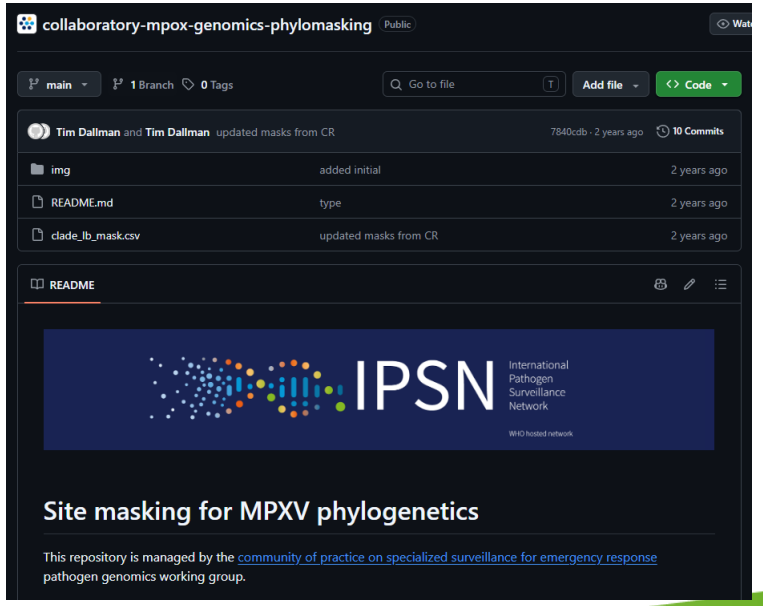
pre-commit.ci passed

This repository contains three workflows for the analysis of mpox virus (MPXV) data:

- `ingest/` - Download data from GenBank, clean and curate it and upload it to S3
- `phylogenetic/` - Filter sequences, align, construct phylogeny and export for visualization
- `nextclade/` - Make Nextclade datasets for nextstrain/nextclade_data

Each folder contains a README.md with more information. The results of running both workflows are publicly visible at nextstrain.org/mpox.

### Installation



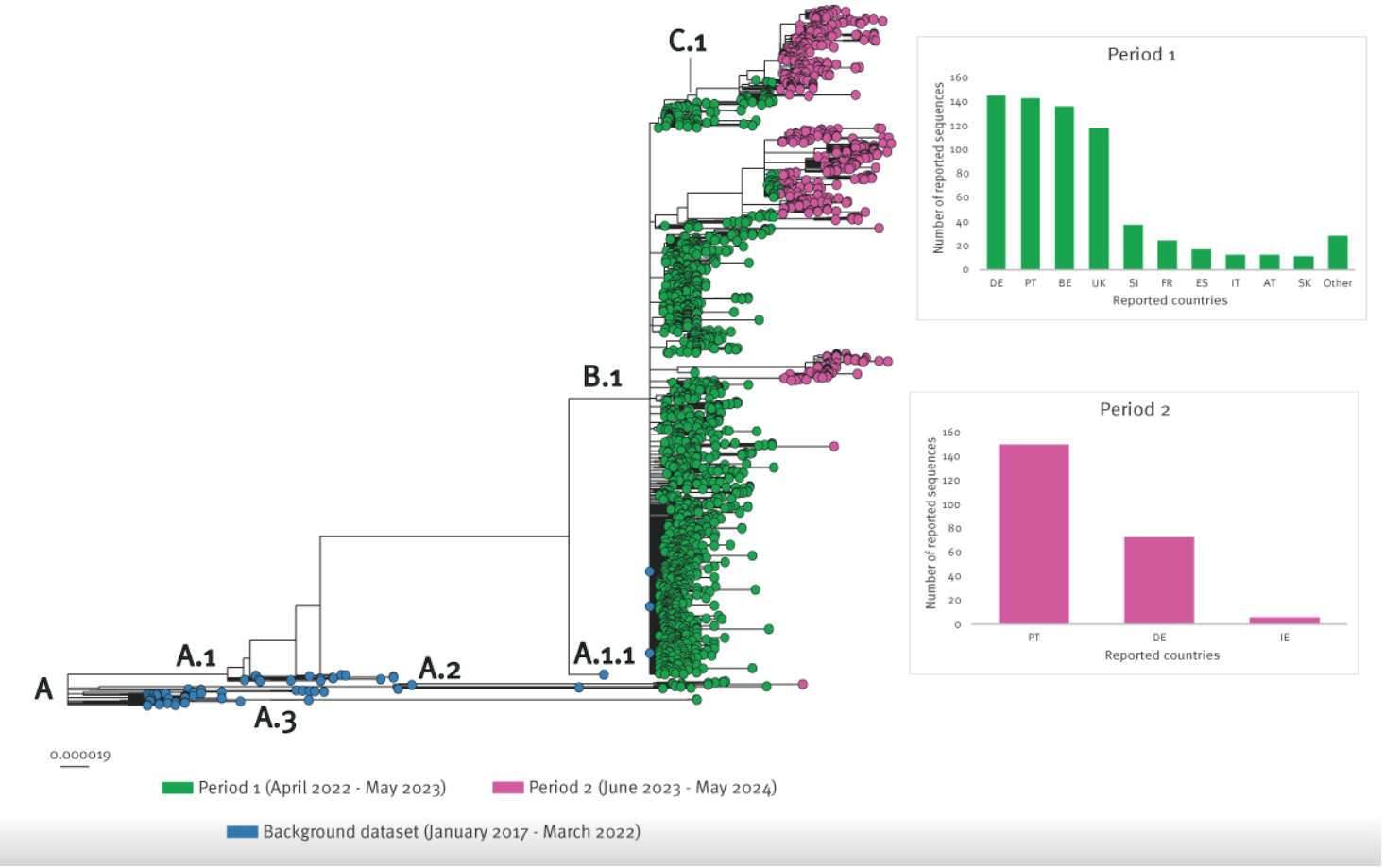
# Sequence Retrieval, Quality Control and Dataset Preparation

- **Retrieve mpox sequences and metadata**
  - Download latest sequences from Pathoplexus/NCBI using the Nextstrain ingest workflow
  - Retrieve associated epidemiological metadata and Nextclade quality metrics
- **Supplement with GISAID EpiPox / private sequences submitted to ECDC**
  - Download clade-specific sequences
  - Generate standardized metadata and quality assessment using Nextclade
- **Create integrated dataset**
  - Merge GISAID and Pathoplexus datasets
  - Apply quality control and metadata harmonization

# Data analysis

- Augur Filter (can be customized)
  - min_date: 1900, min_length: 170000, query: "(QC_rare_mutations == 'good' | QC_rare_mutations == 'mediocre')"  include: "defaults/WHO-masking-clade-i/include.txt"
  - subsample:  everything: >-  --query 'clade in ["Ib", "Ib/IIb"]
- Alignment with Nextclade (also considers reverse complementing sequence)
- Masking sites
  - **WHO International Pathogen Surveillance Network (IPSN)** WHO-Collaboratory/collaboratory-mpox-genomics-phylomasking for clade Ib
  - aineniamh/squirrel
- Tree using IQtree2 (default)
- Tree refining with Timetree
- Output with nwk and metadata file, also json to view with nextstrain

# Phylogenetic Insights from MPXV Clade IIb Genomic Surveillance










- Clade IIb sequences were dominated by the B.1 lineage and did not cluster by geographical region
- In Period 2, sequences clustered into distinct major clusters (some country-specific clusters) belonging to B.1 and C.1 lineages.



Rapid communication

Open Access

Continued circulation of mpox: an epidemiological and phylogenetic assessment, European Region, 2023 to 2024

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View Affiliations

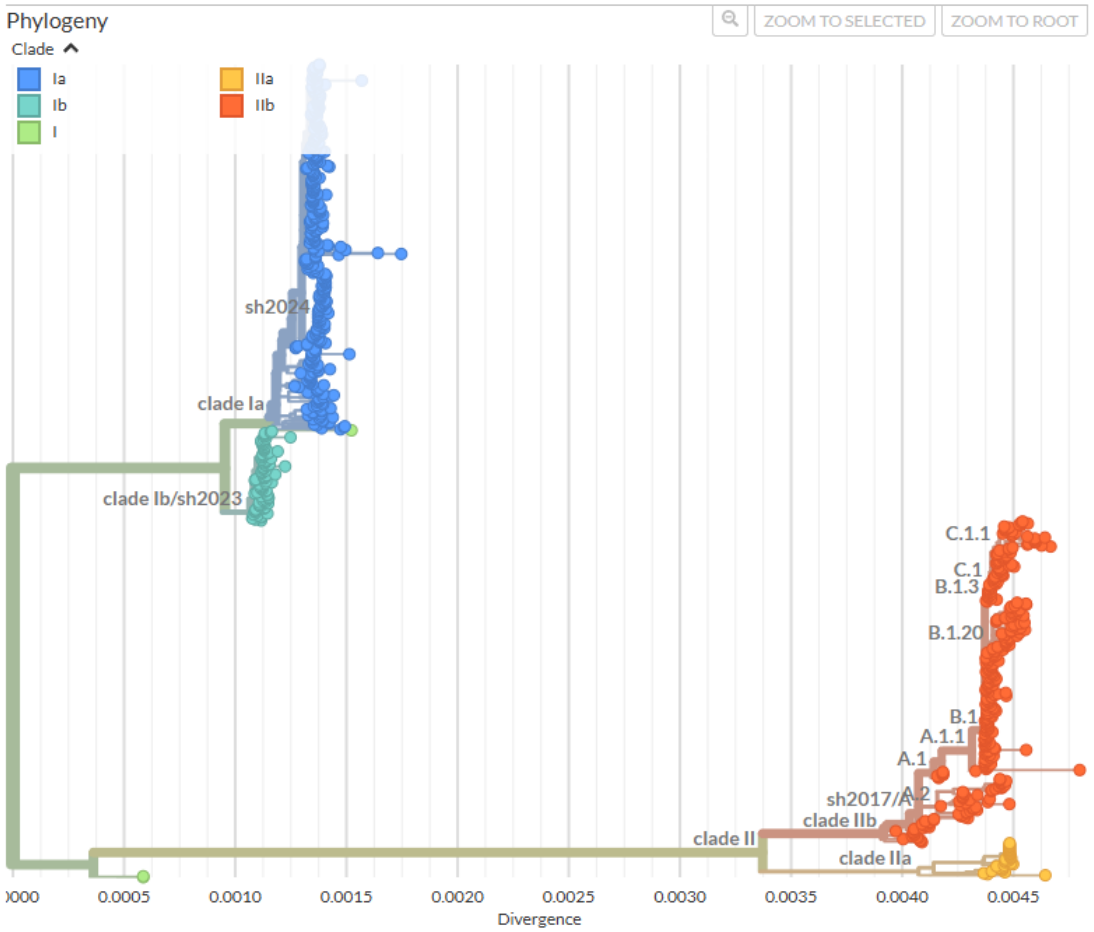
[Eurosurveillance | Continued circulation of mpox: an epidemiological and phylogenetic assessment, European Region, 2023 to 2024]

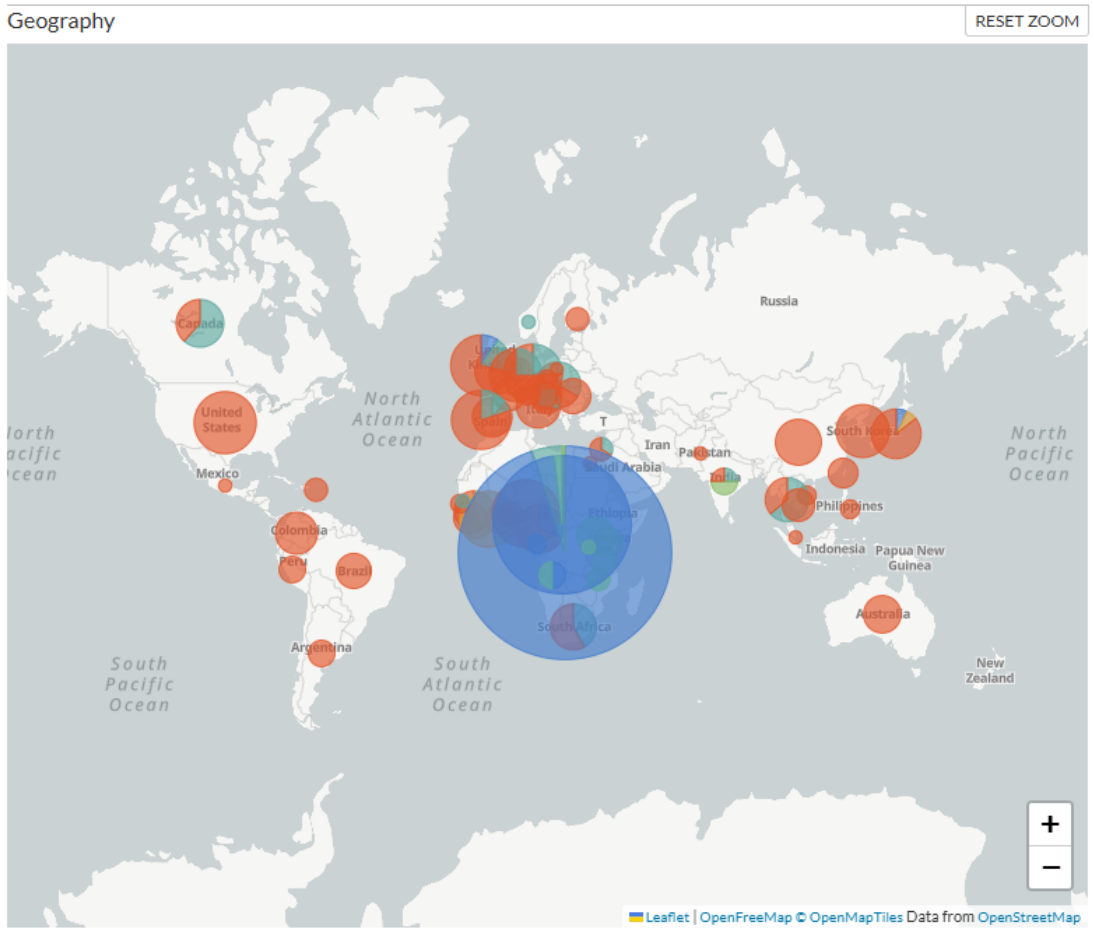
# Nextstrain visualization

## Genomic epidemiology of mpox viruses across clades

Built with nextstrain/mpox. Maintained by Nextstrain team. Data updated 2026-10-07. Enabled by data from GenBank and Pathoplexus.

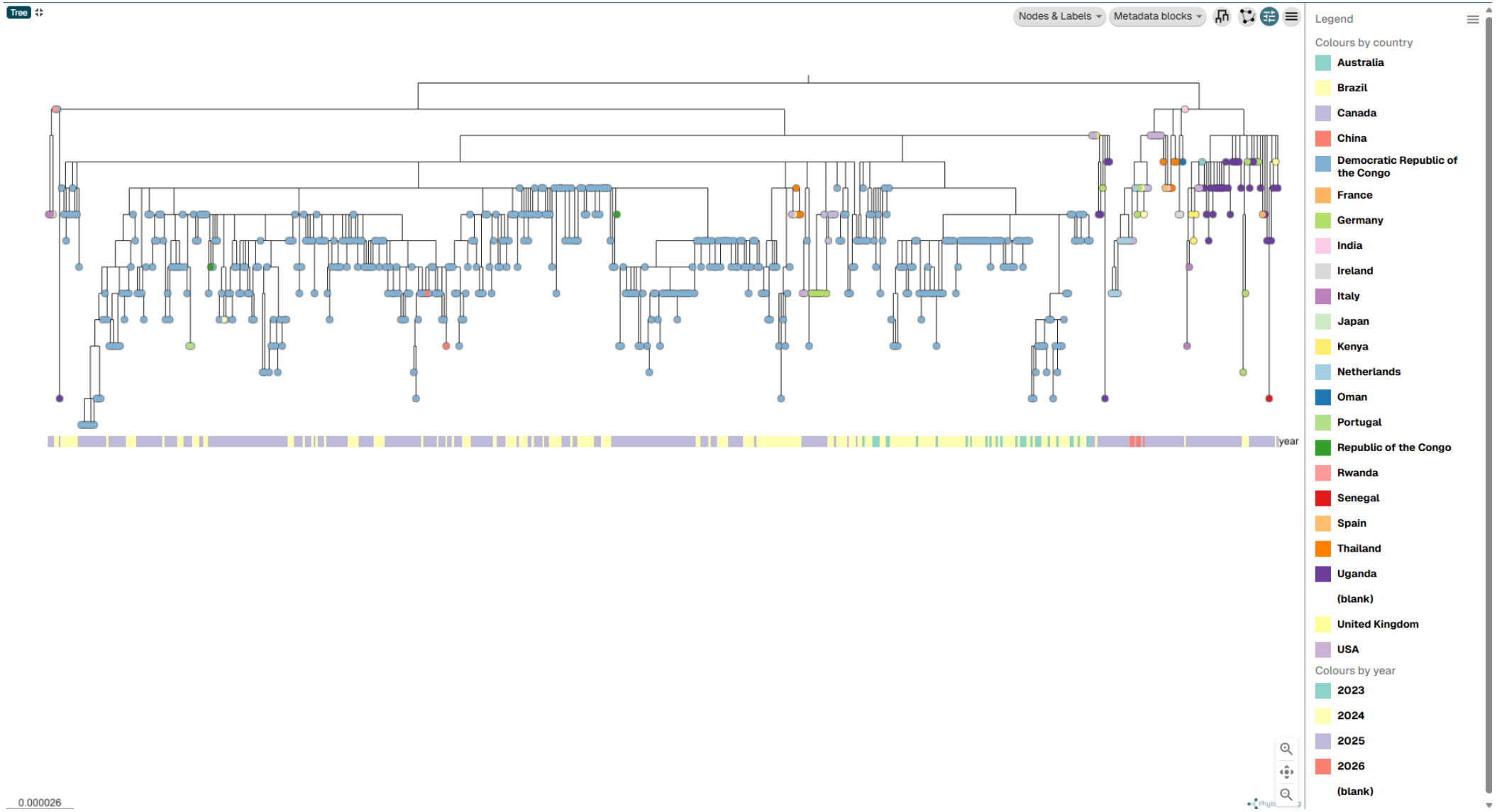
Showing 812 of 812 genomes.




Nextstrain / mpox / all-clades

# MicroReact


Tree
Nodes & Labels
Metadata blocks
year
0.000026
Legend
Colours by country
Australia
Brazil
Canada
China
Democratic Republic of the Congo
France
Germany
India
Ireland
Italy
Japan
Kenya
Netherlands
Oman
Portugal
Republic of the Congo
Rwanda
Senegal
Spain
Thailand
Uganda
(blank)
United Kingdom
USA
Colours by year
2023
2024
2025
2026
(blank)

# Conclusions

- Genomic surveillance provides critical insights beyond routine case surveillance, enabling **clade and lineage classification**, detection of transmission chains, and identification of importation events.
- Integration of genomic, epidemiological, and public health data strengthens the **integrated surveillance approach** and supports evidence-based risk assessment and response.
- Harmonised analytical pipelines, quality control procedures, and standardized masking strategies improve the reliability and comparability of MPXV genomic analyses.
- Timely sharing of sequences and metadata through platforms such as Pathoplexus, NCBI, GISAID EpiPox, and EpiPulse is essential for effective regional and global surveillance.
- Continued investment in sequencing capacity, bioinformatics expertise, and cross-sector collaboration will enhance preparedness for emerging MPXV variants and future outbreaks.