

A Global Overview of Antimicrobial Resistance in *Salmonella enterica*

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Outline

- **Overview**
- **Aim & research question**
- **Data processing**
- **Results**
- **Future plan**

Salmonella

Salmonella public health issues

- human & animals
- foods & food products
- inter-country contamination



Learn about outbreaks of *Salmonella* associated with backyard poultry



Learn about an outbreak of *Salmonella* Muenster infections linked to pet bearded dragons.



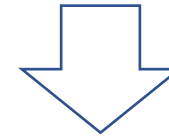
Learn about an outbreak of *Salmonella* Typhimurium infections linked to pet hedgehogs.



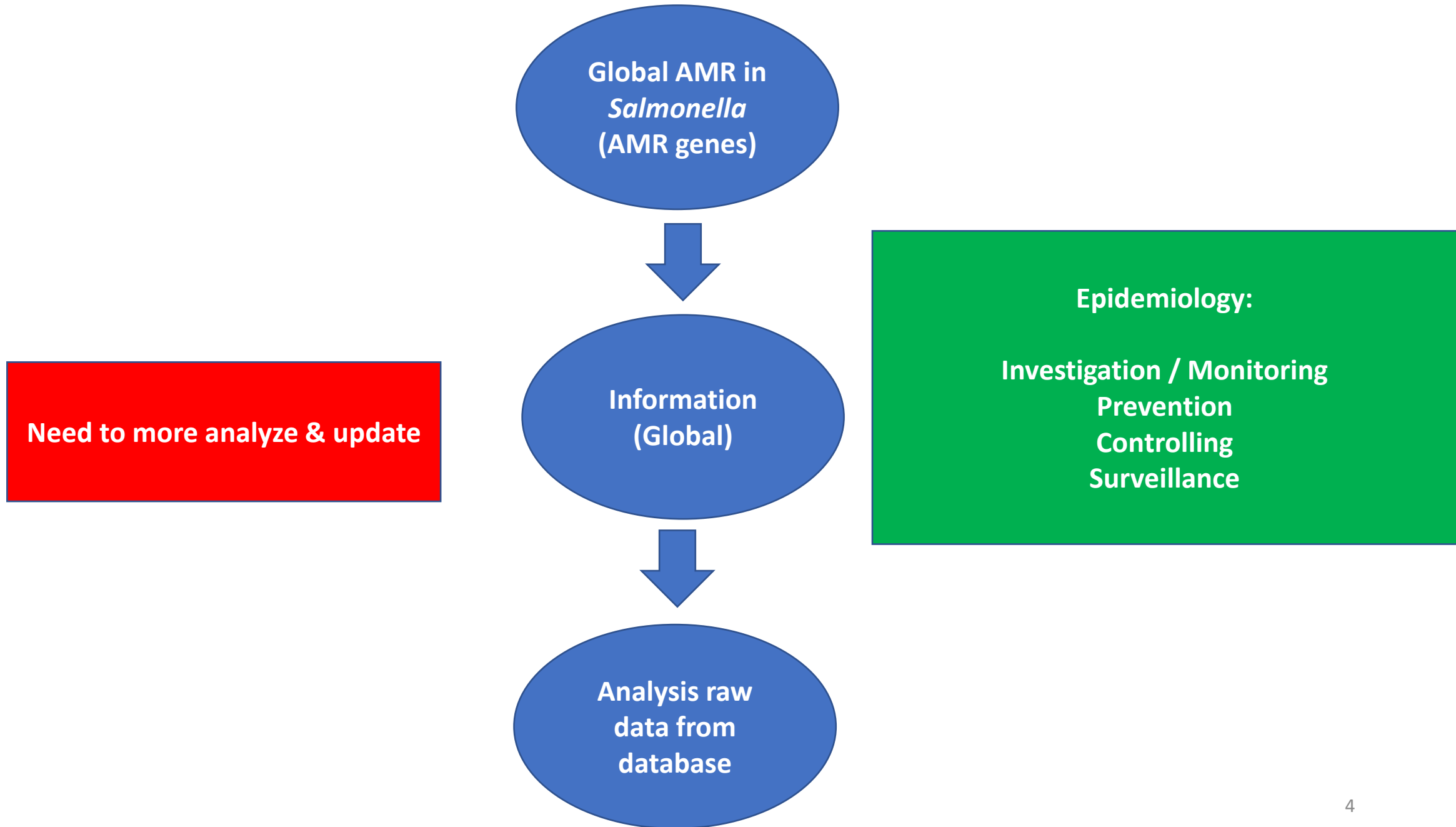
Get tips to help protect you and your family from a *Salmonella* infection.



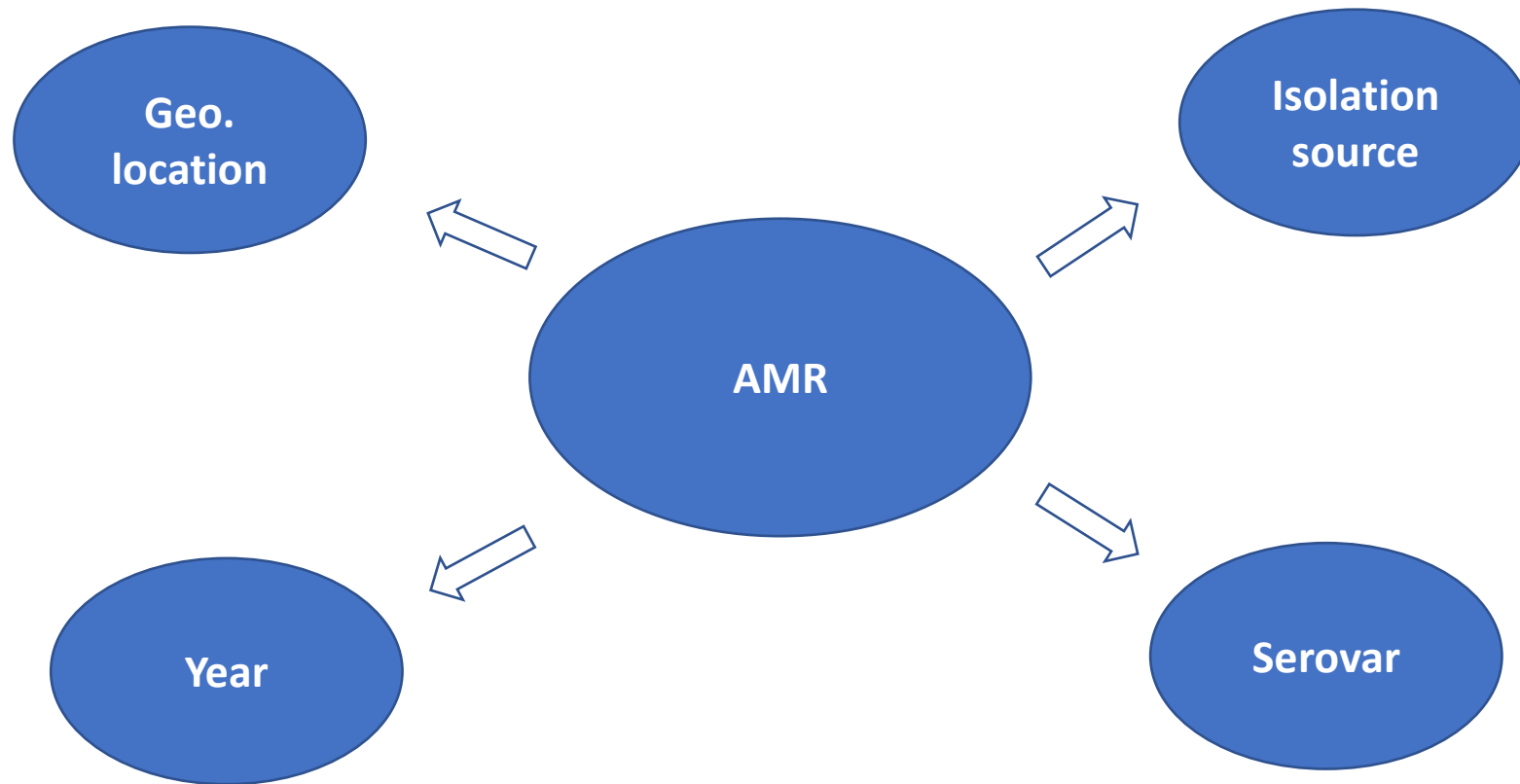
Animal reservoir



Eradication from the world?



Aim of the study



Research question

- What / Which
 - What is the common AMRs found in global *Salmonella*?
 - What is the common **isolation sources** related to AMRs in global *Salmonella*?
 - Which **year** is the common presence of AMRs in global *Salmonella*?
- Where
 - Where is the common **geographical location** related to AMRs ?
 - Where is the common genetic location of AMRs in global *Salmonella* genome? (chromosome /plasmid etc.)
- How
 - How is the evolution of AMRs in global *Salmonella*?



Data analysis

Food QCPipeline

Typing

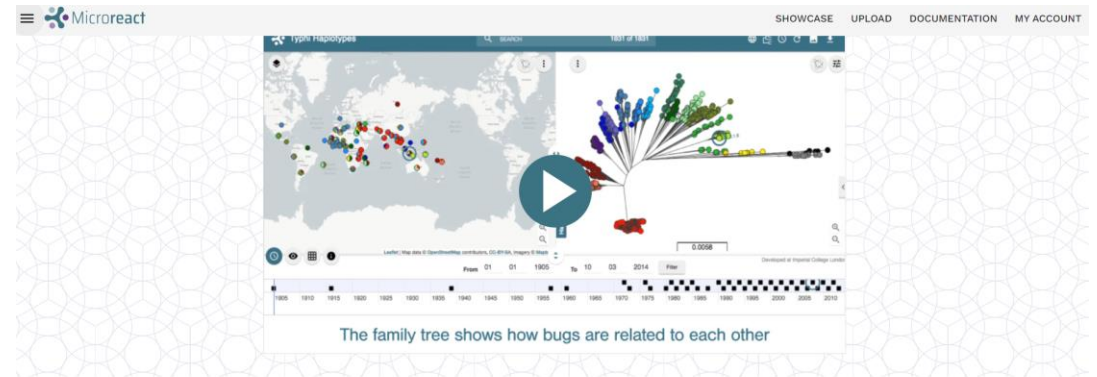
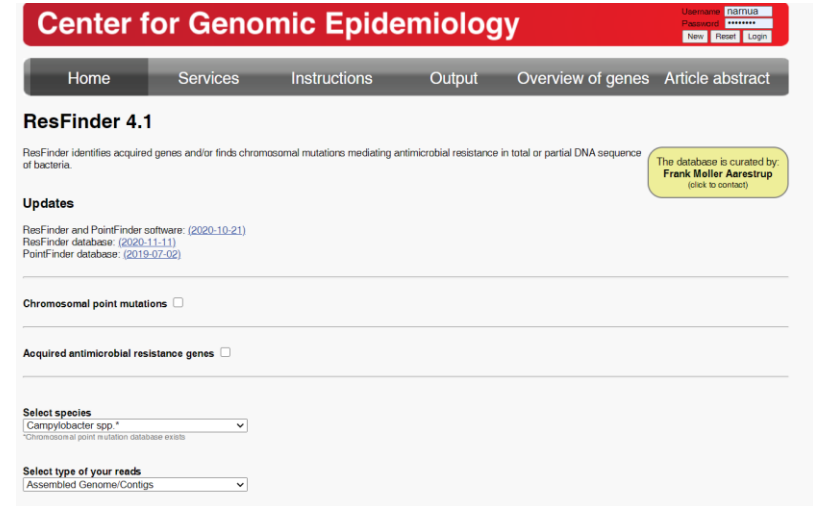
- KmerFinder
- SISTR
- MLST

Resistance gene

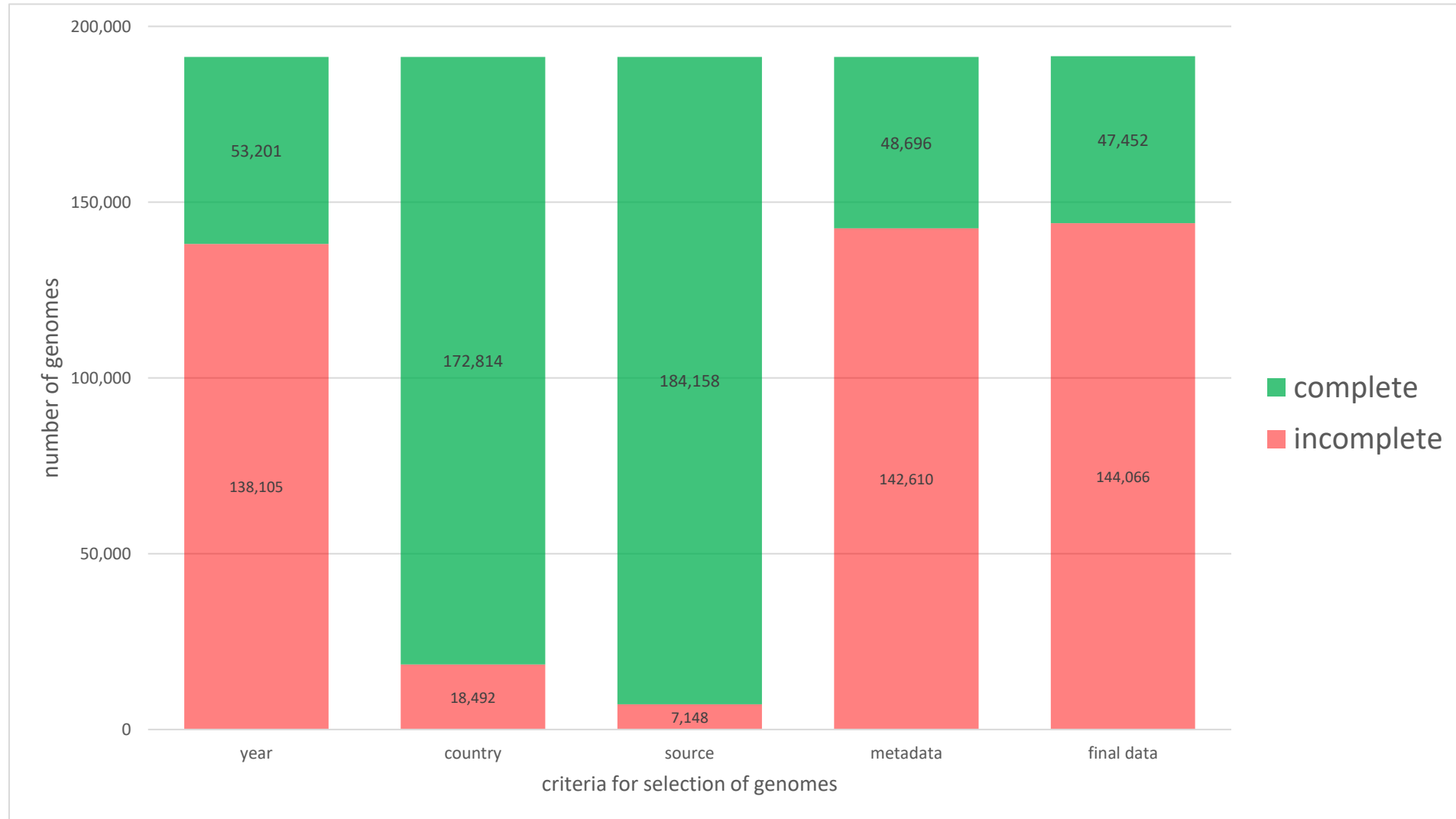
- ResFinder

Data visualization

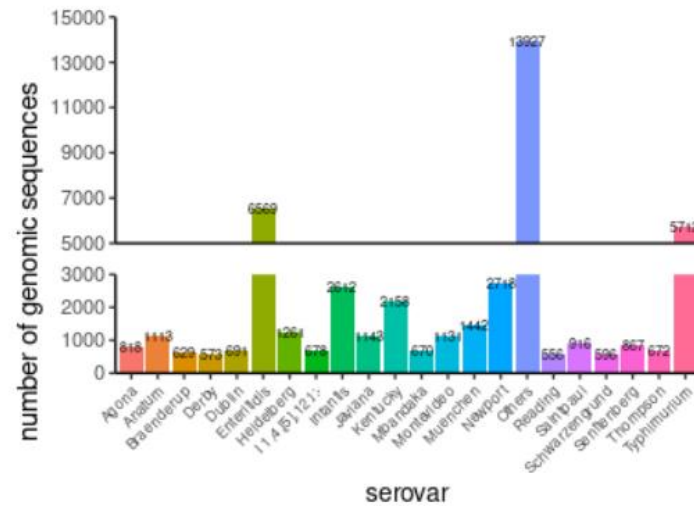
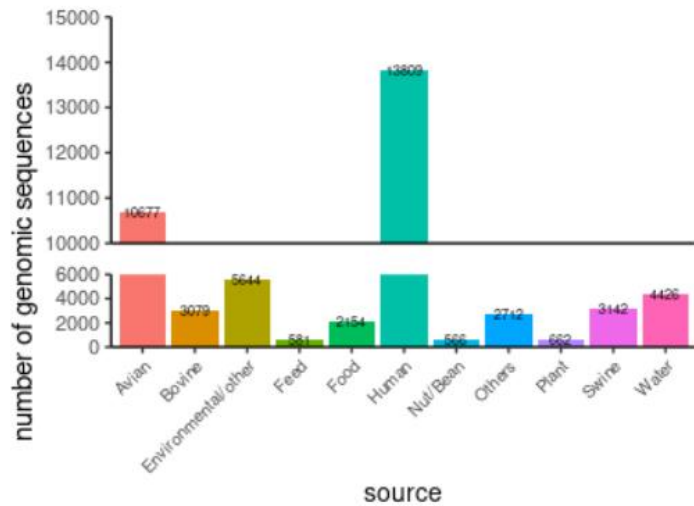
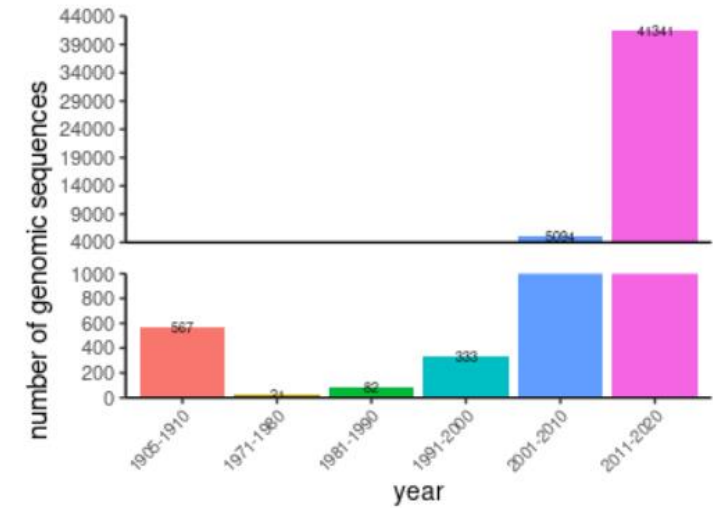
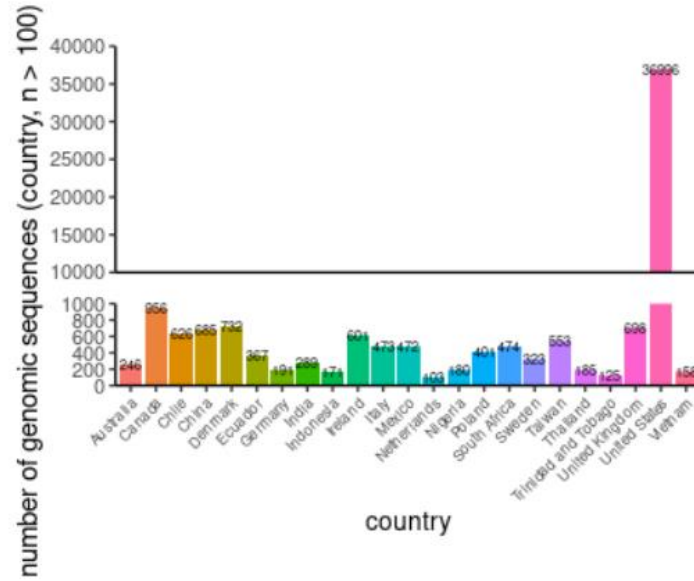
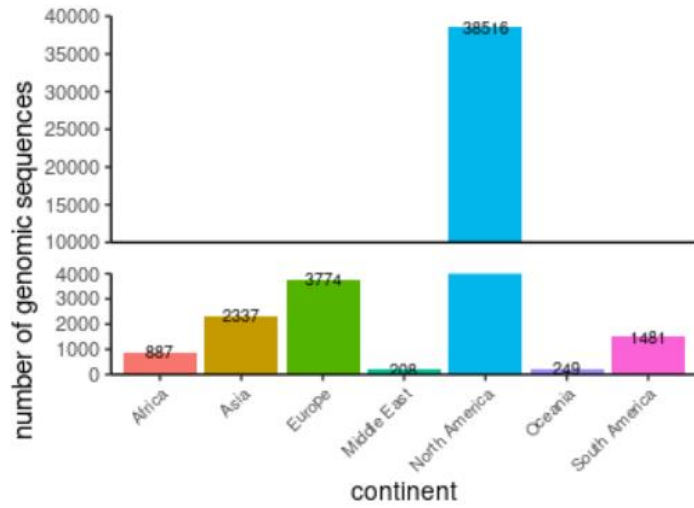
A web-based tool for genomic epidemiology data visualization and sharing



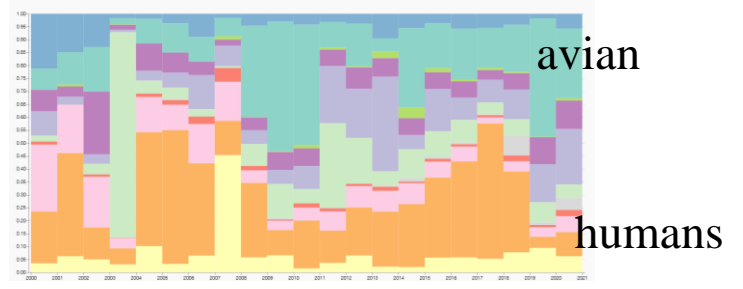
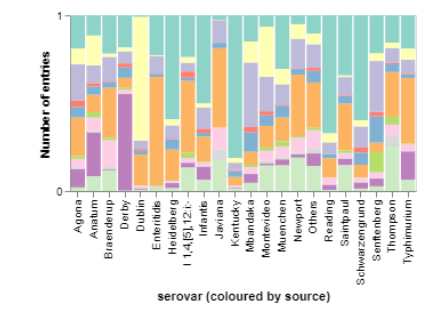
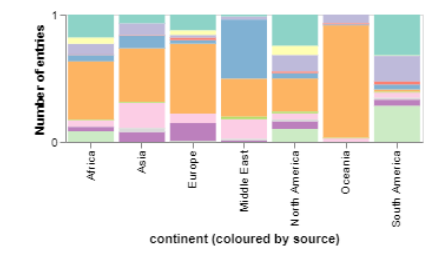
Total number of genomes and metadata



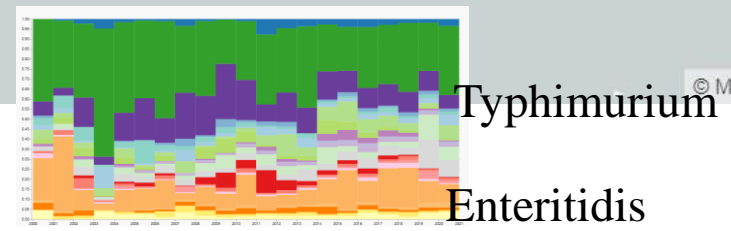
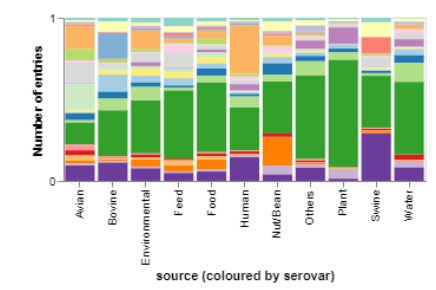
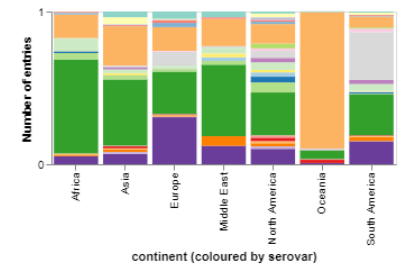
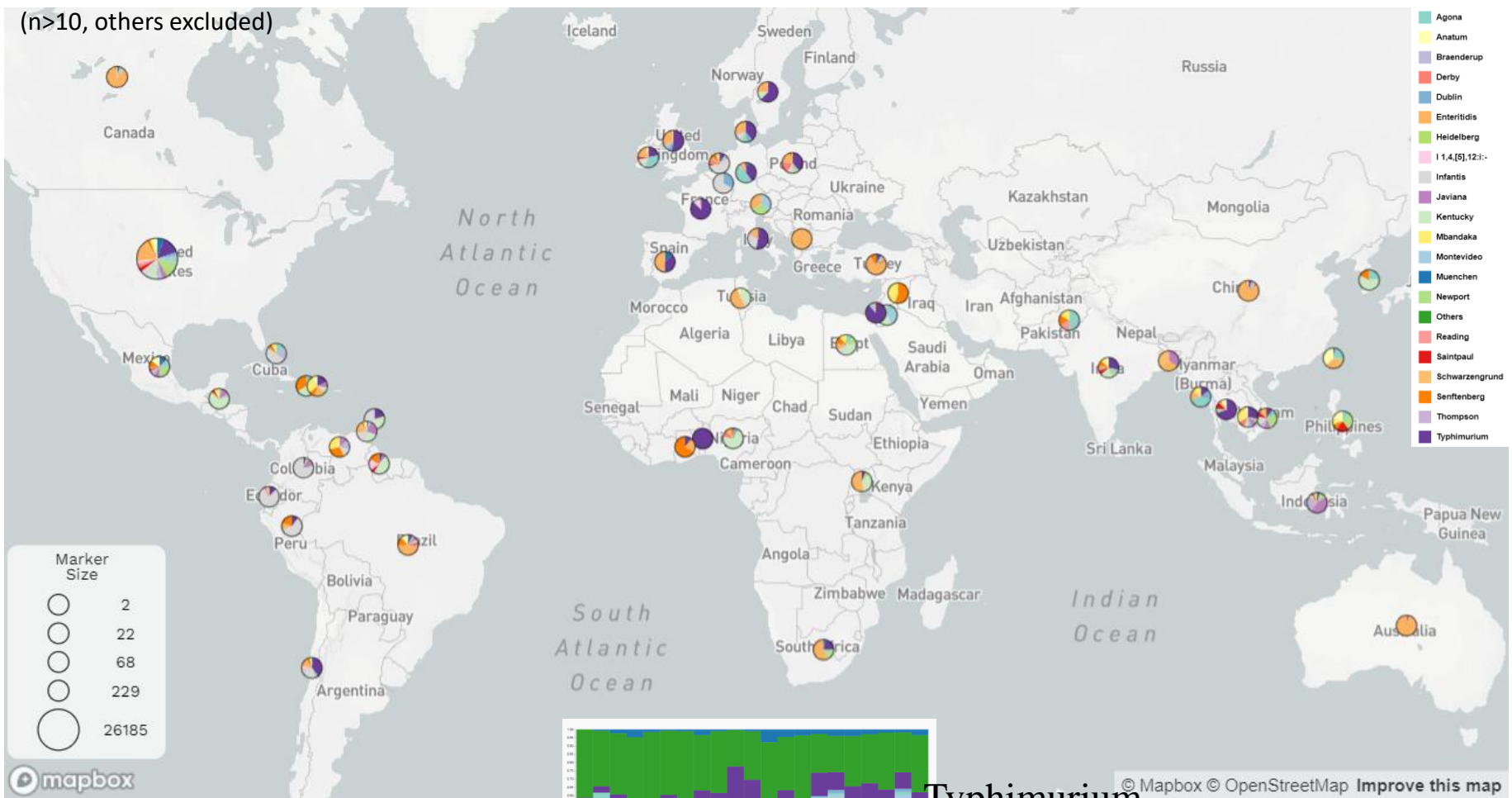
The general information of global *Salmonella enterica*



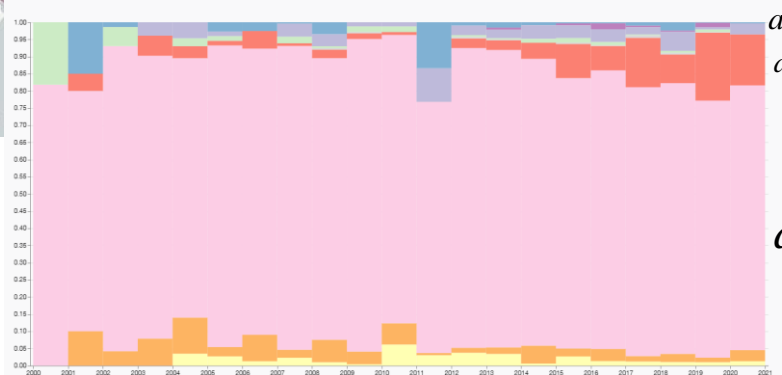
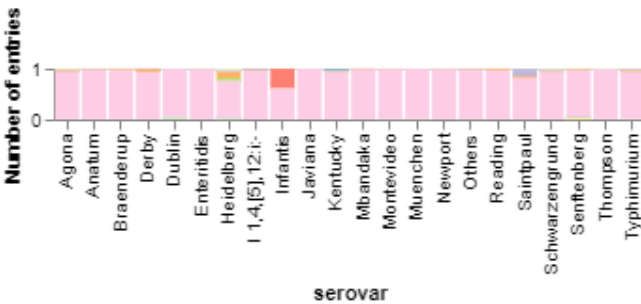
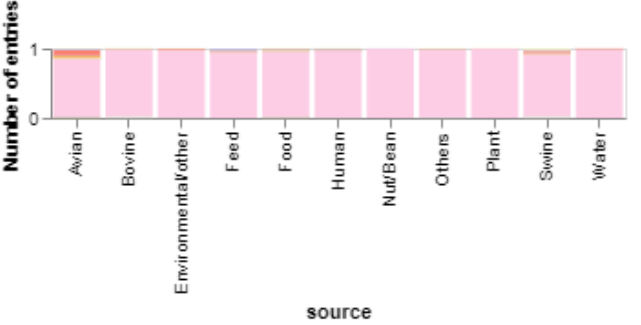
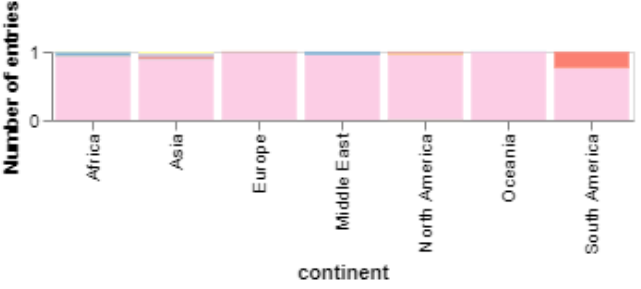
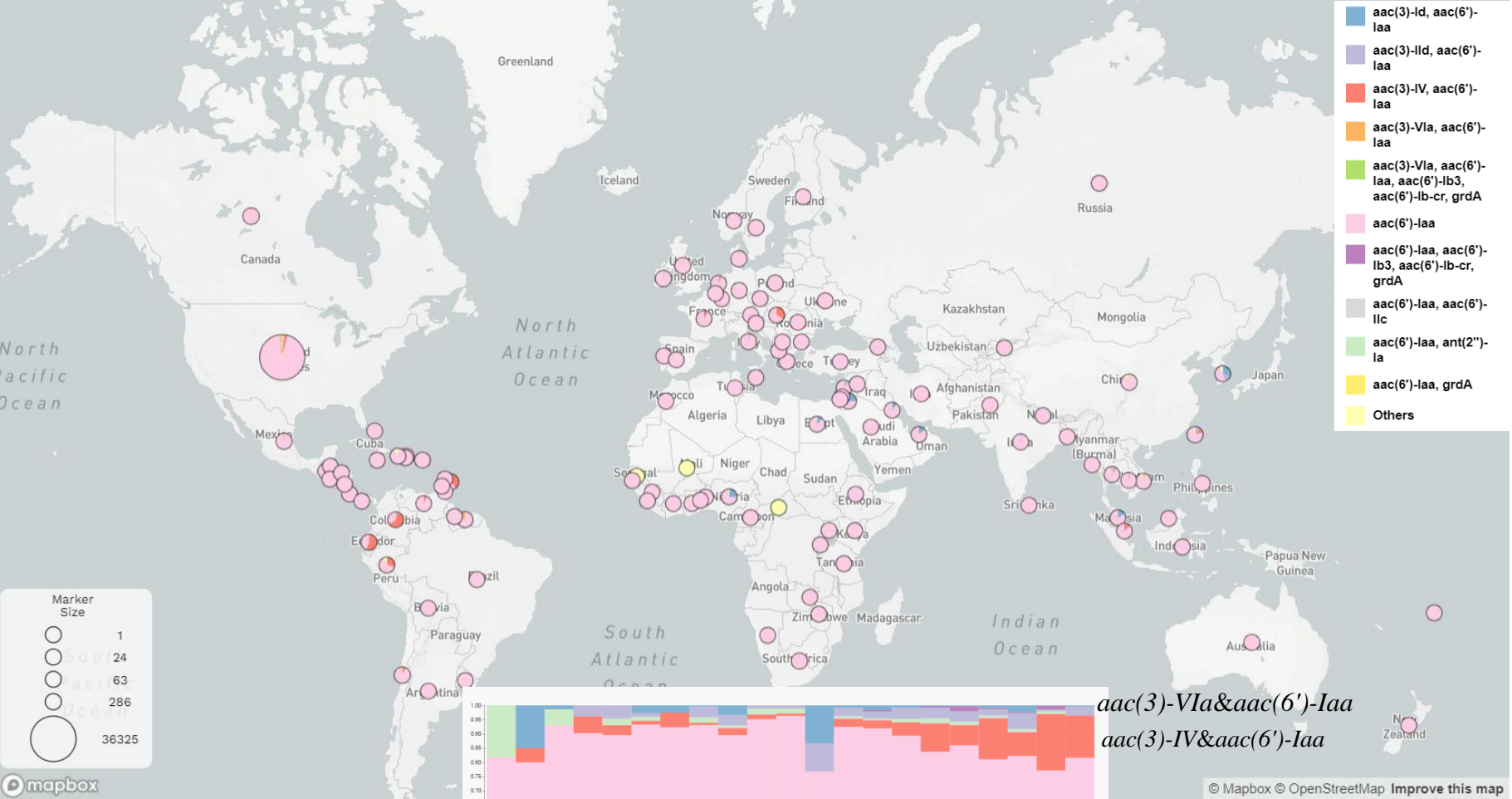
The global distribution of *Salmonella enterica* in different isolation sources divided by continent, serovar, and year



The global distribution of *Salmonella enterica* in different serovar divided by continent, isolation source and year



Aminoglycoside resistance

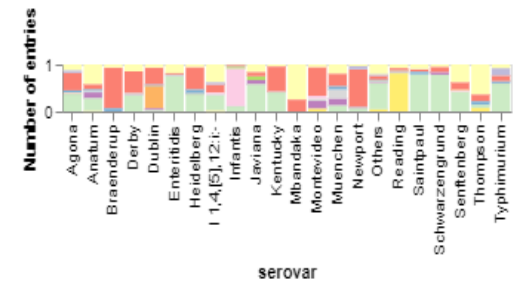
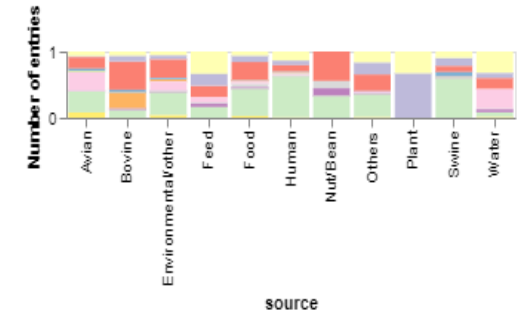
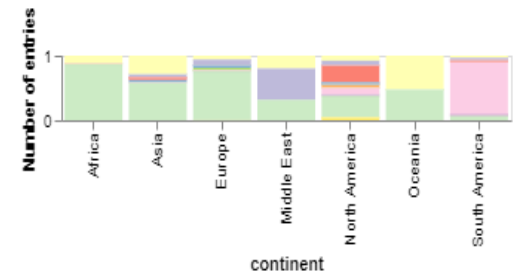
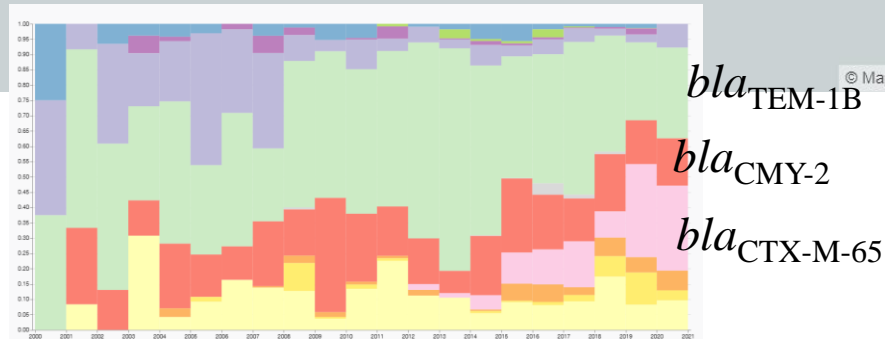
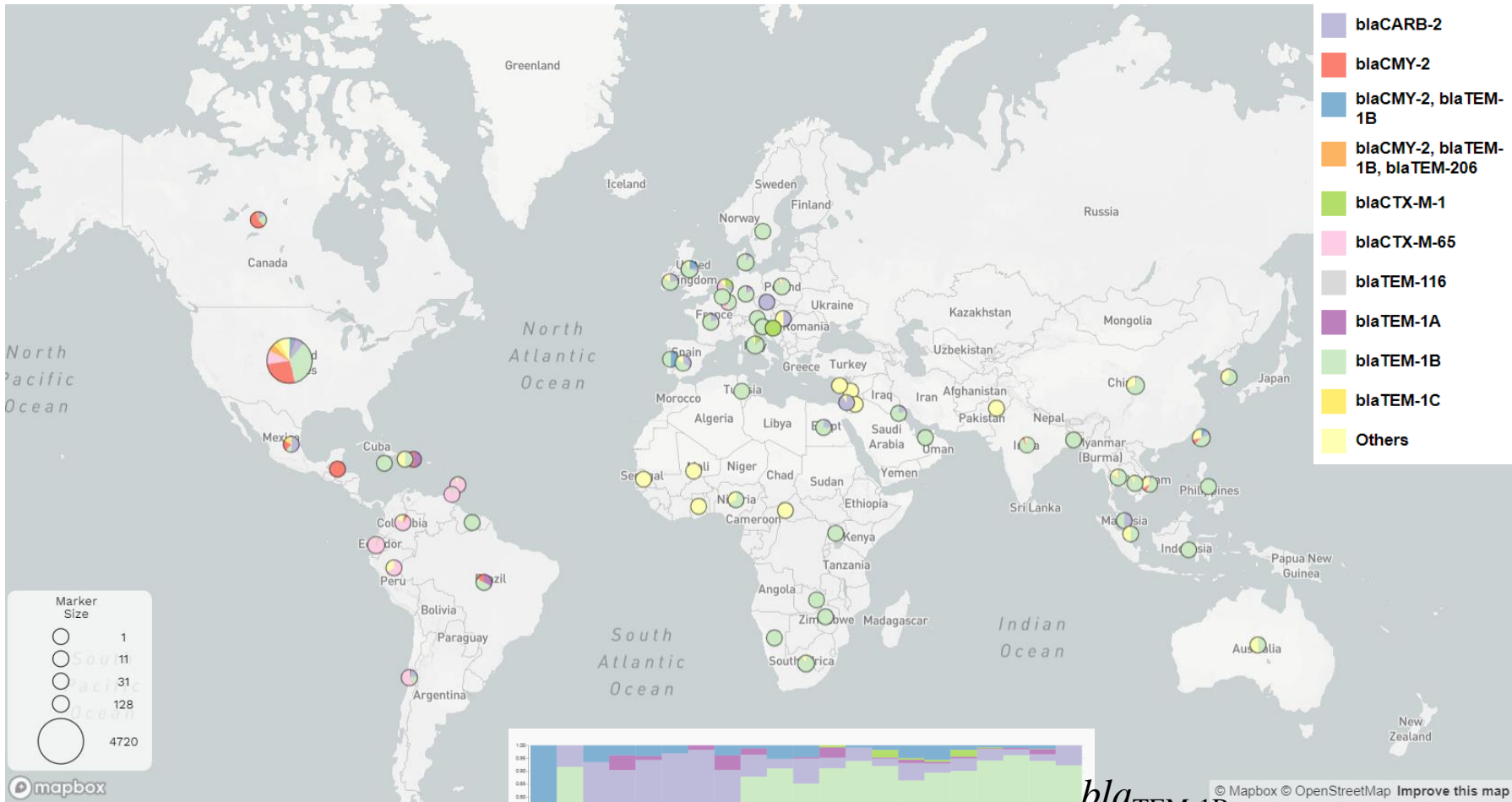


aac(3)-VIa&aac(6')-Iaa

aac(3)-IV&aac(6')-Iaa

aac(6')-Iaa

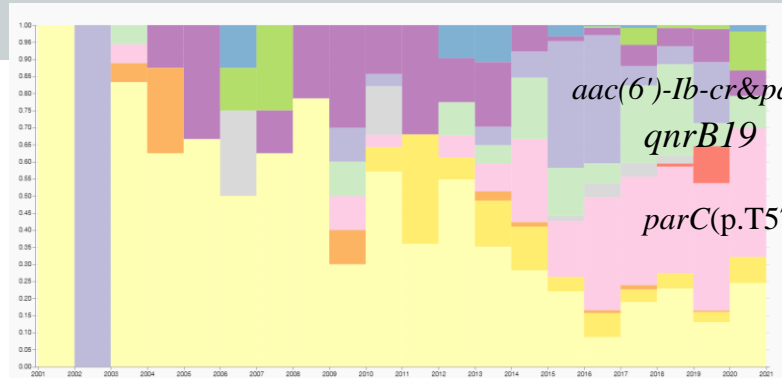
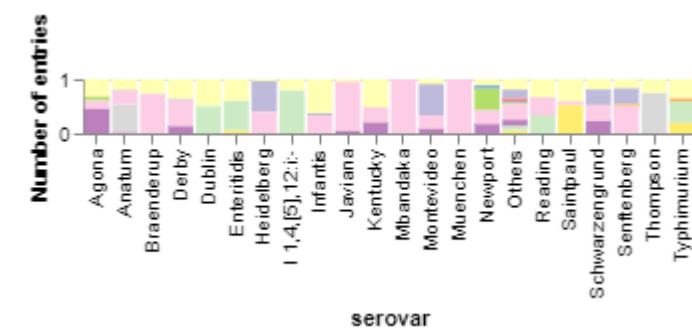
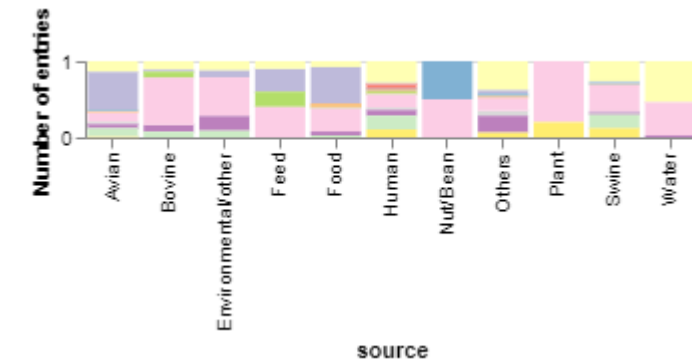
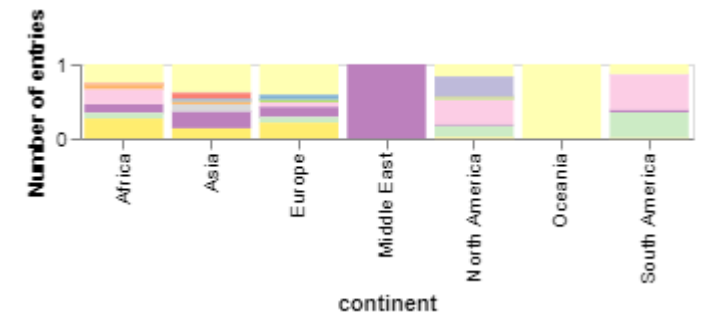
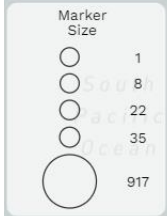
Beta-lactam resistance



Fluoroquinolone resistance

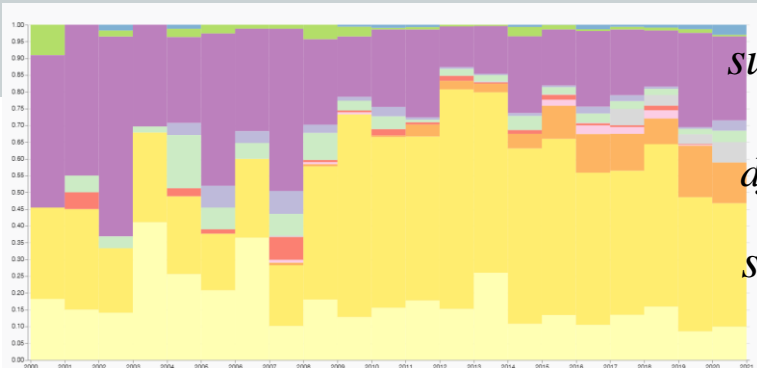
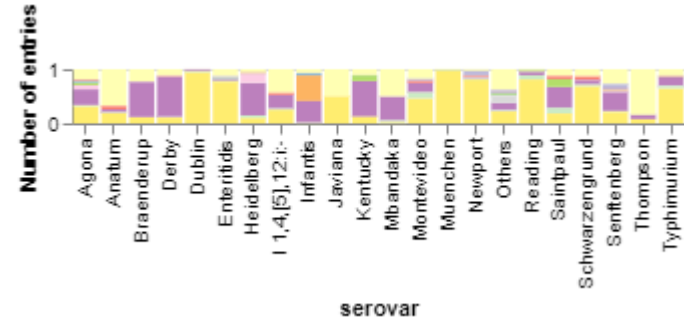
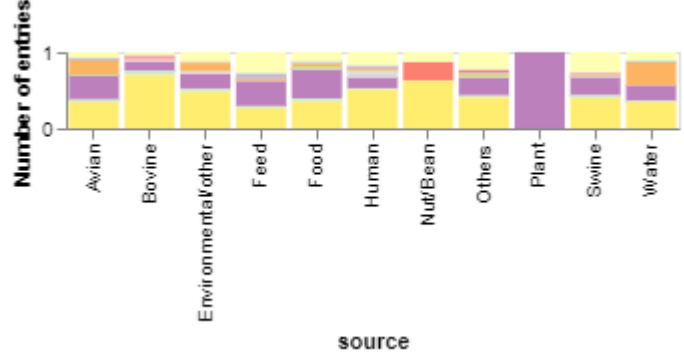
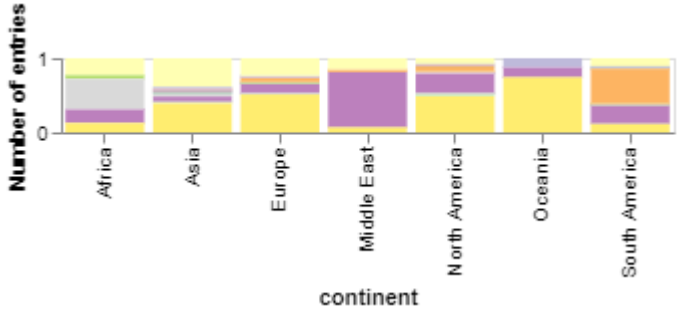
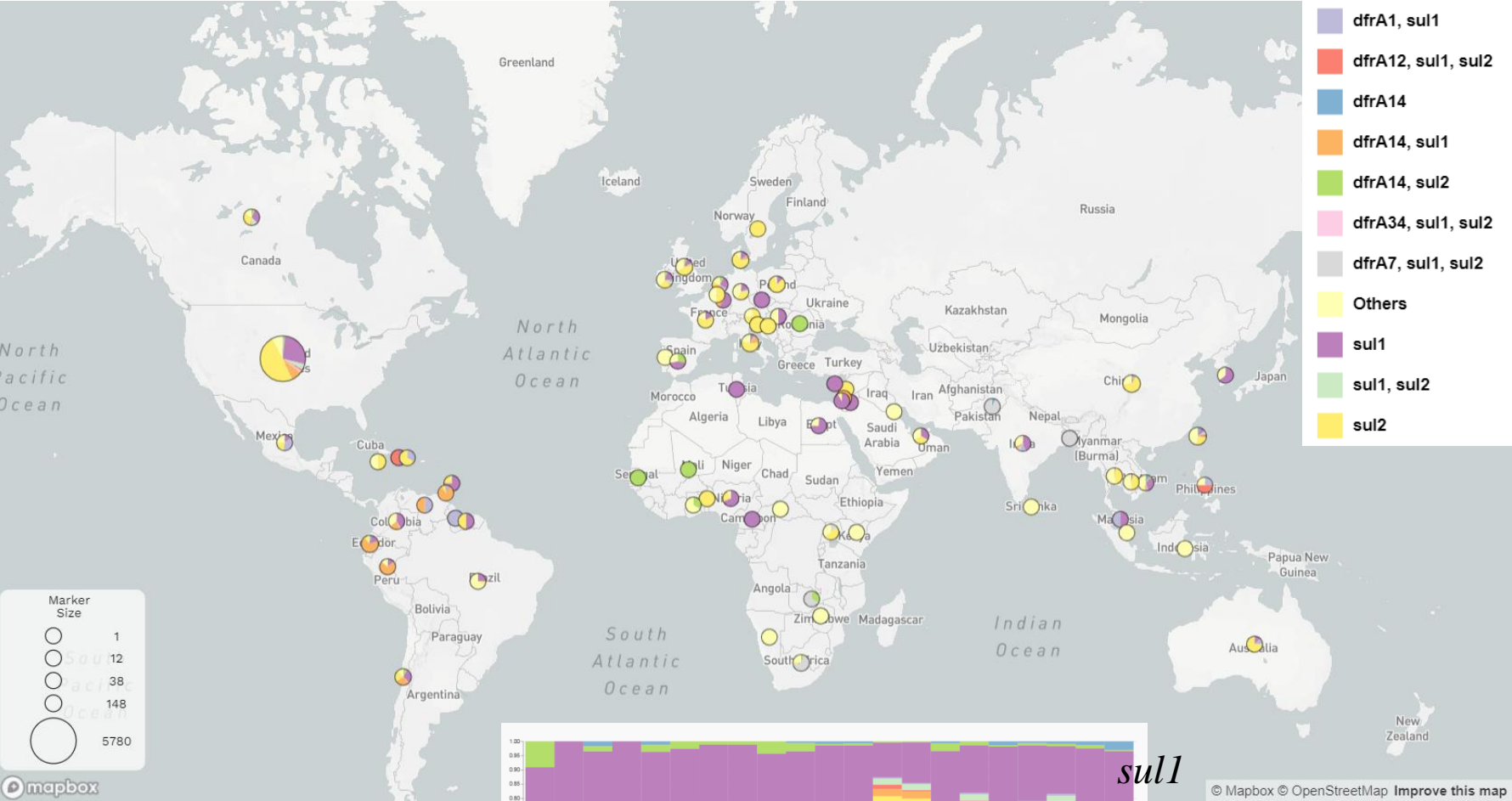


- *aac(6')-Ib-cr, parC (p.T57S)*
- *gyrA (p.S83F), qnrS*
- *gyrA (p.S83Y), parC (p.T57S), qnrS1*
- *oqxA, oqxB*
- Others
- *parC (p.T57S), qnrA1*
- *parC (p.T57S), qnrB19*
- *parC (p.T57S), qnrB4*
- *parC (p.T57S), qnrS1*
- *qnrB19*
- *qnrS1*



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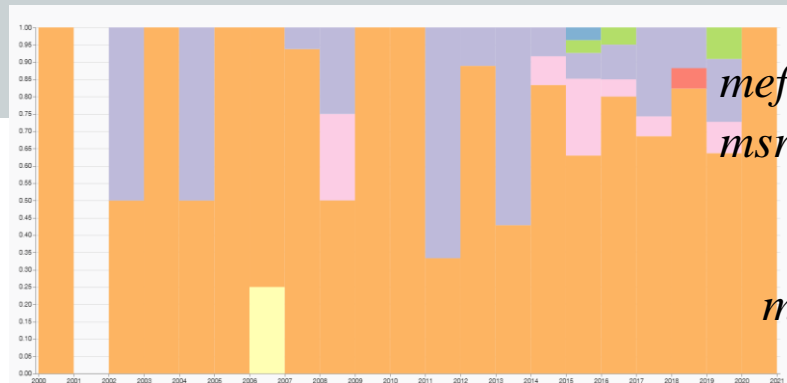
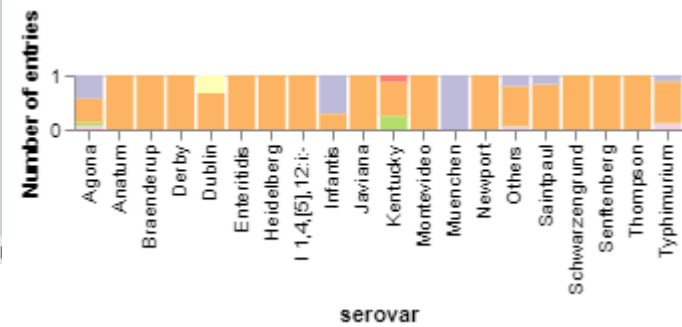
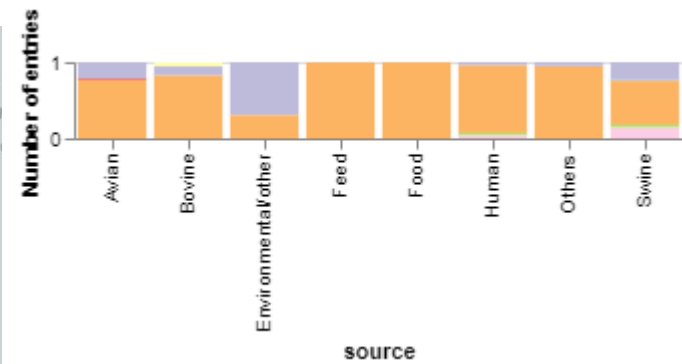
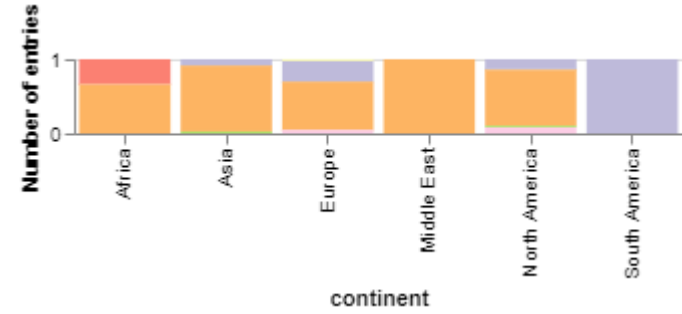
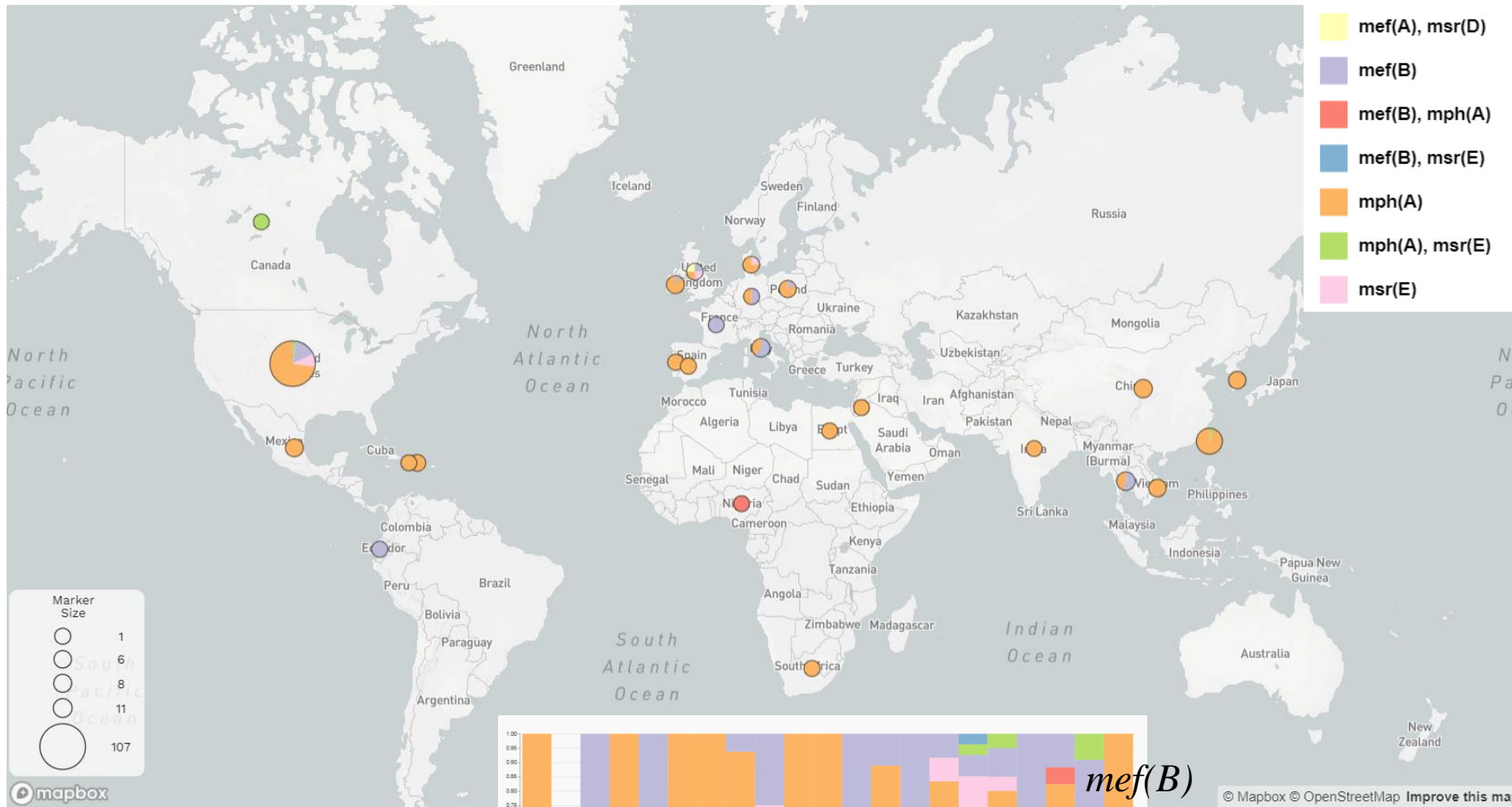
Folate pathway antagonist resistance



sul1
dfrA14&sul1
sul2

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Macrolide resistance

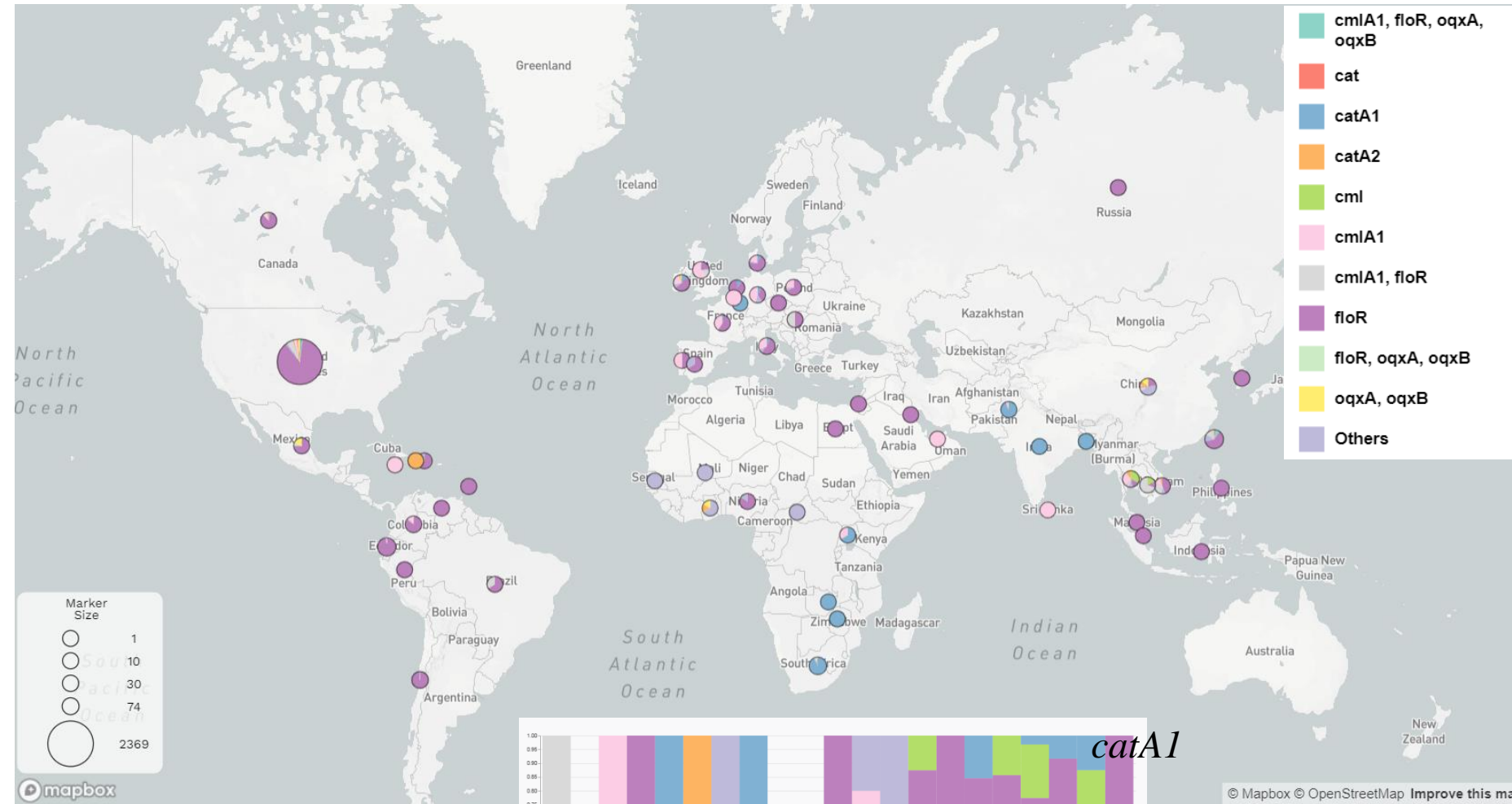


mef(B)
msr(E)

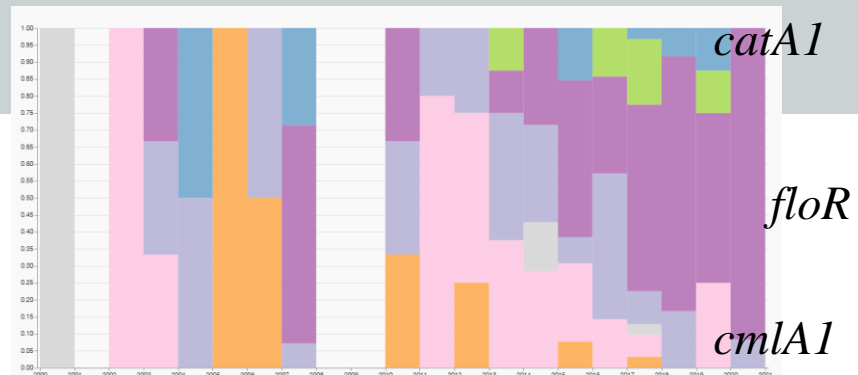
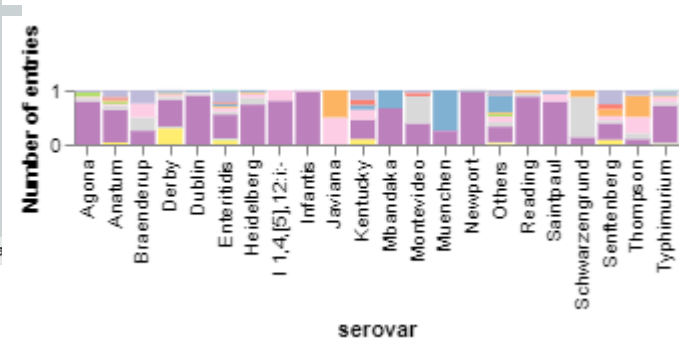
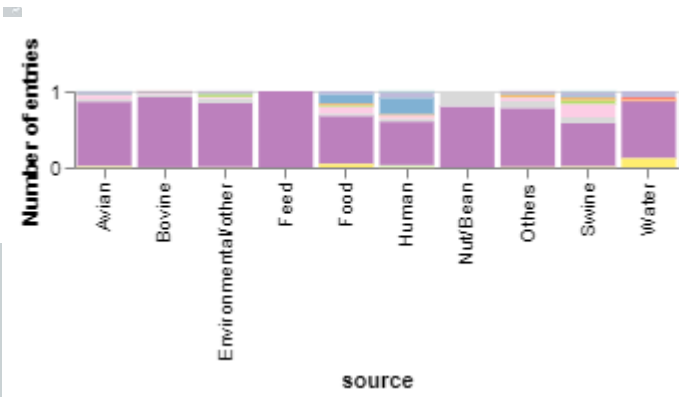
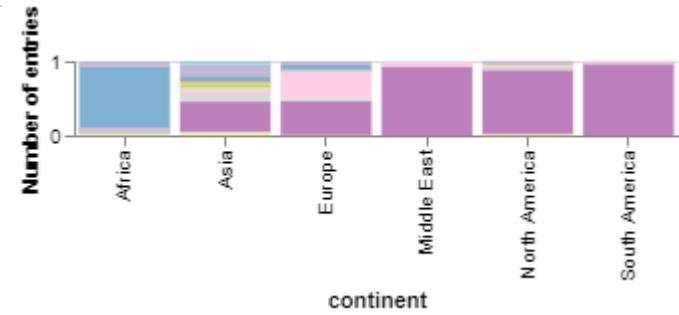
mph(A)

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Phenicol resistance

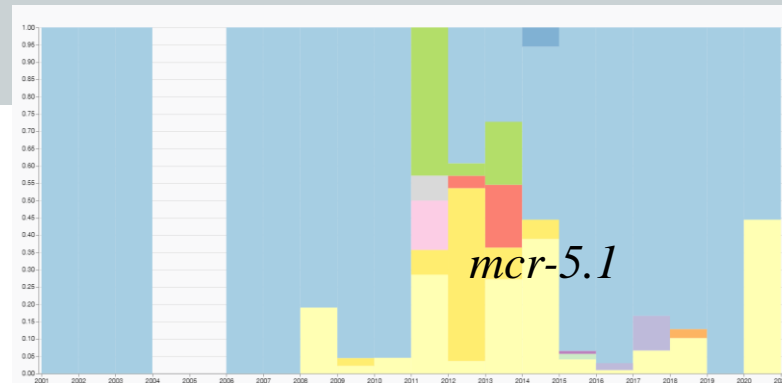
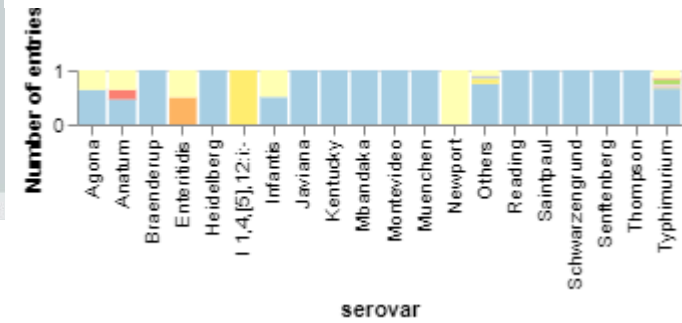
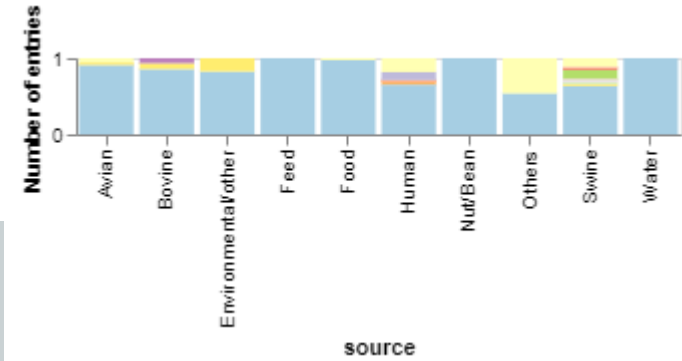
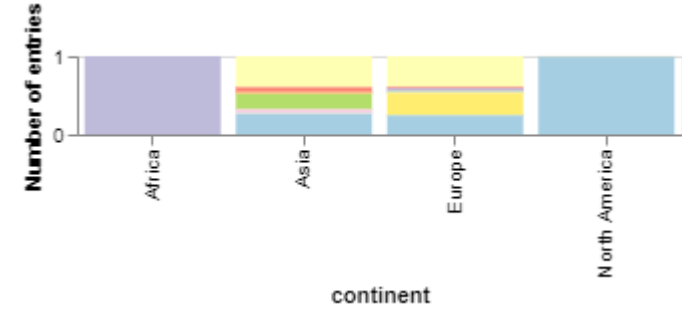
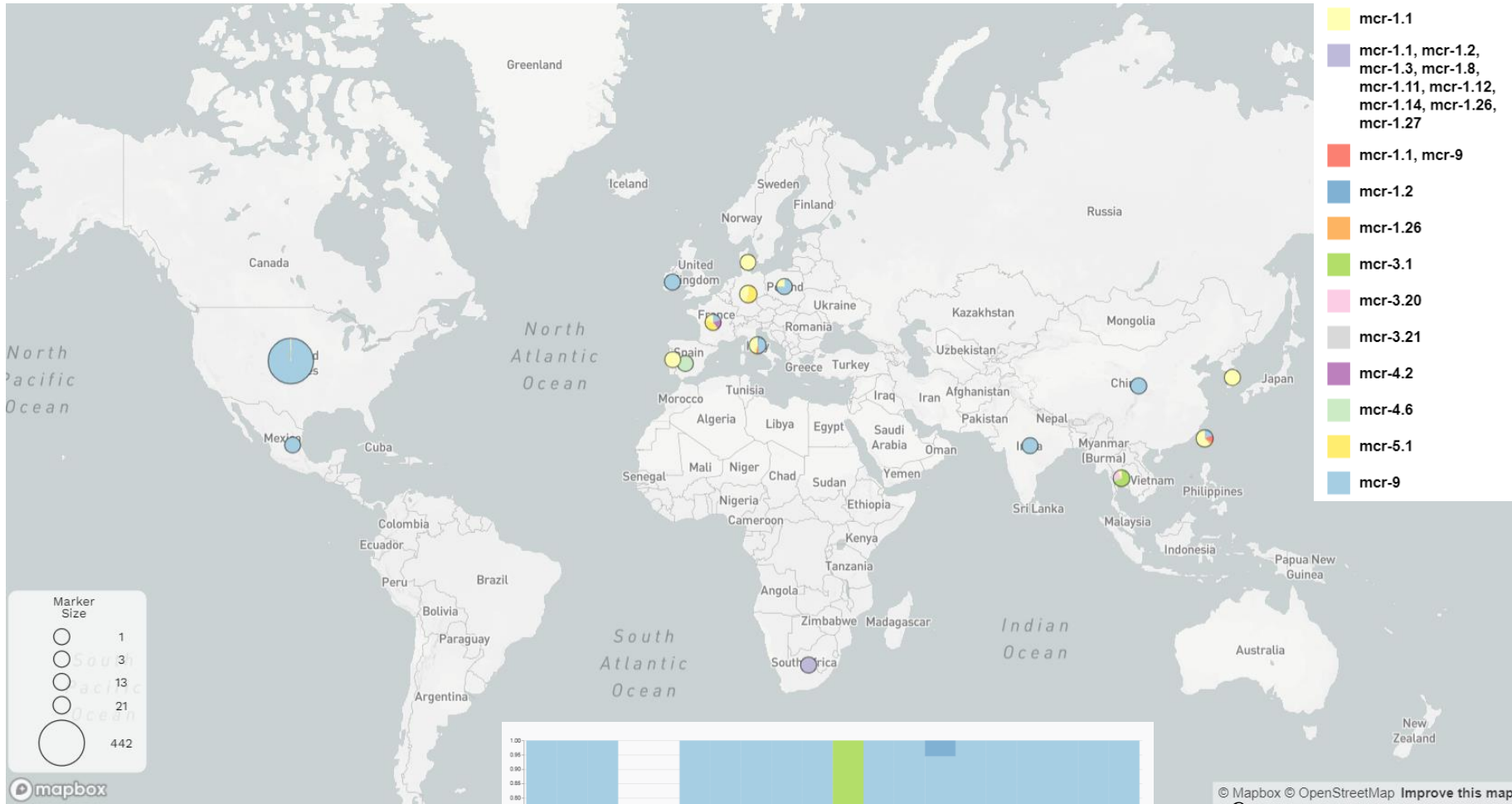


- *cmlA1*, *floR*, *oqxA*, *oqxB*
- *cat*
- *catA1*
- *catA2*
- *cml*
- *cmlA1*
- *cmlA1*, *floR*
- *floR*
- *floR*, *oqxA*, *oqxB*
- *oqxA*, *oqxB*
- Others

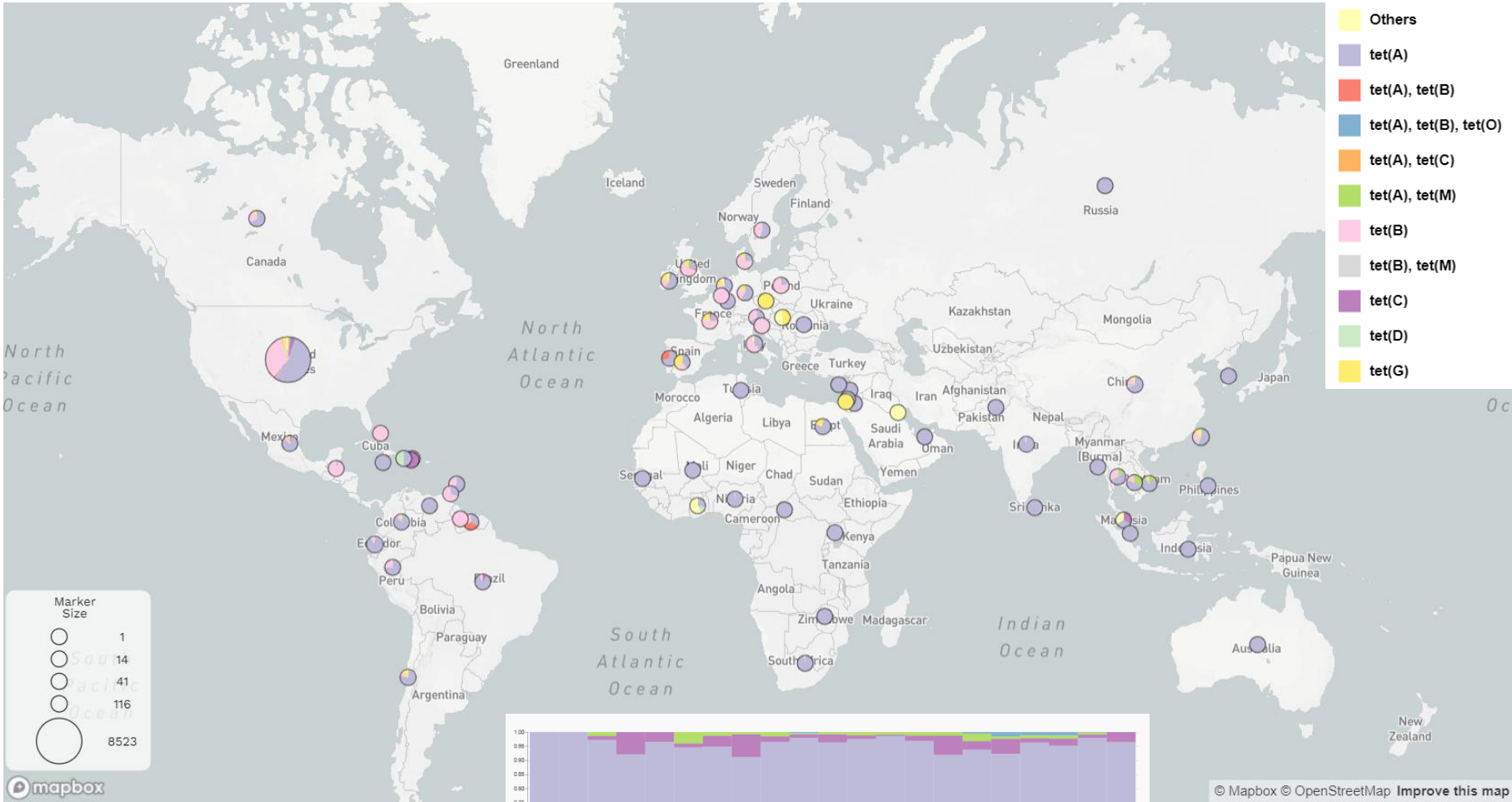


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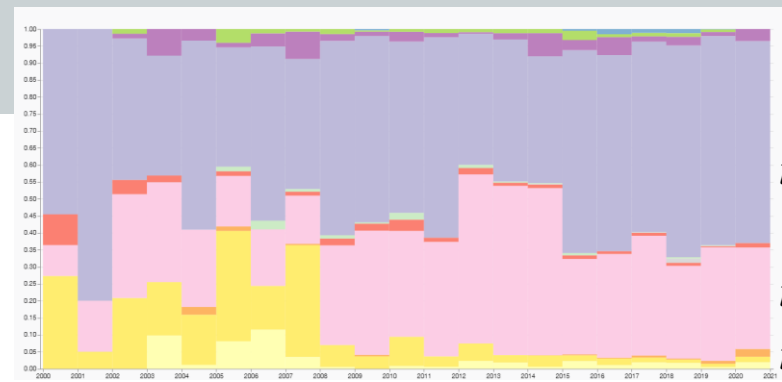
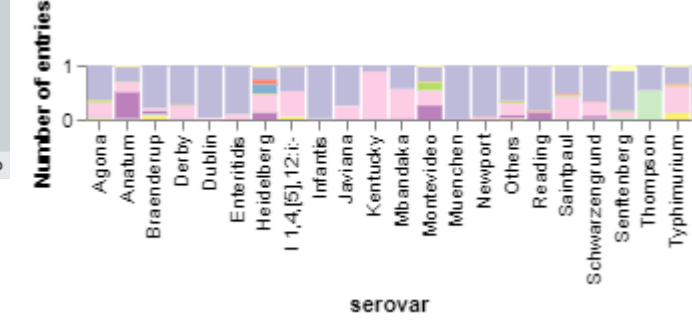
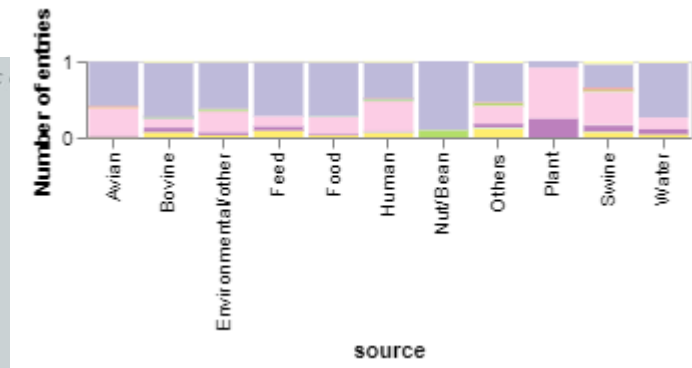
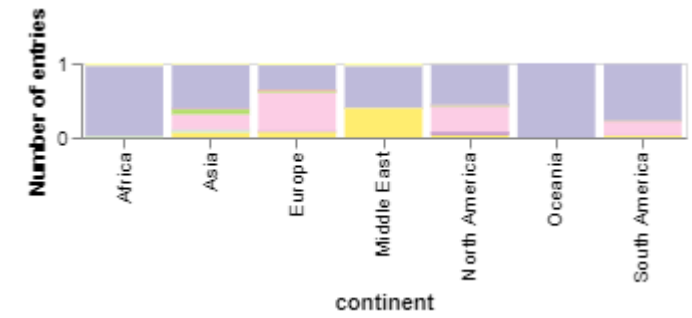
Polymyxin resistance



Tetracycline resistance



- Others
- tet(A)
- tet(A), tet(B)
- tet(A), tet(B), tet(O)
- tet(A), tet(C)
- tet(A), tet(M)
- tet(B)
- tet(B), tet(M)
- tet(C)
- tet(D)
- tet(G)



tet(A)
tet(B)
tet(G)

Future plan

- Evolution of specific AMR

