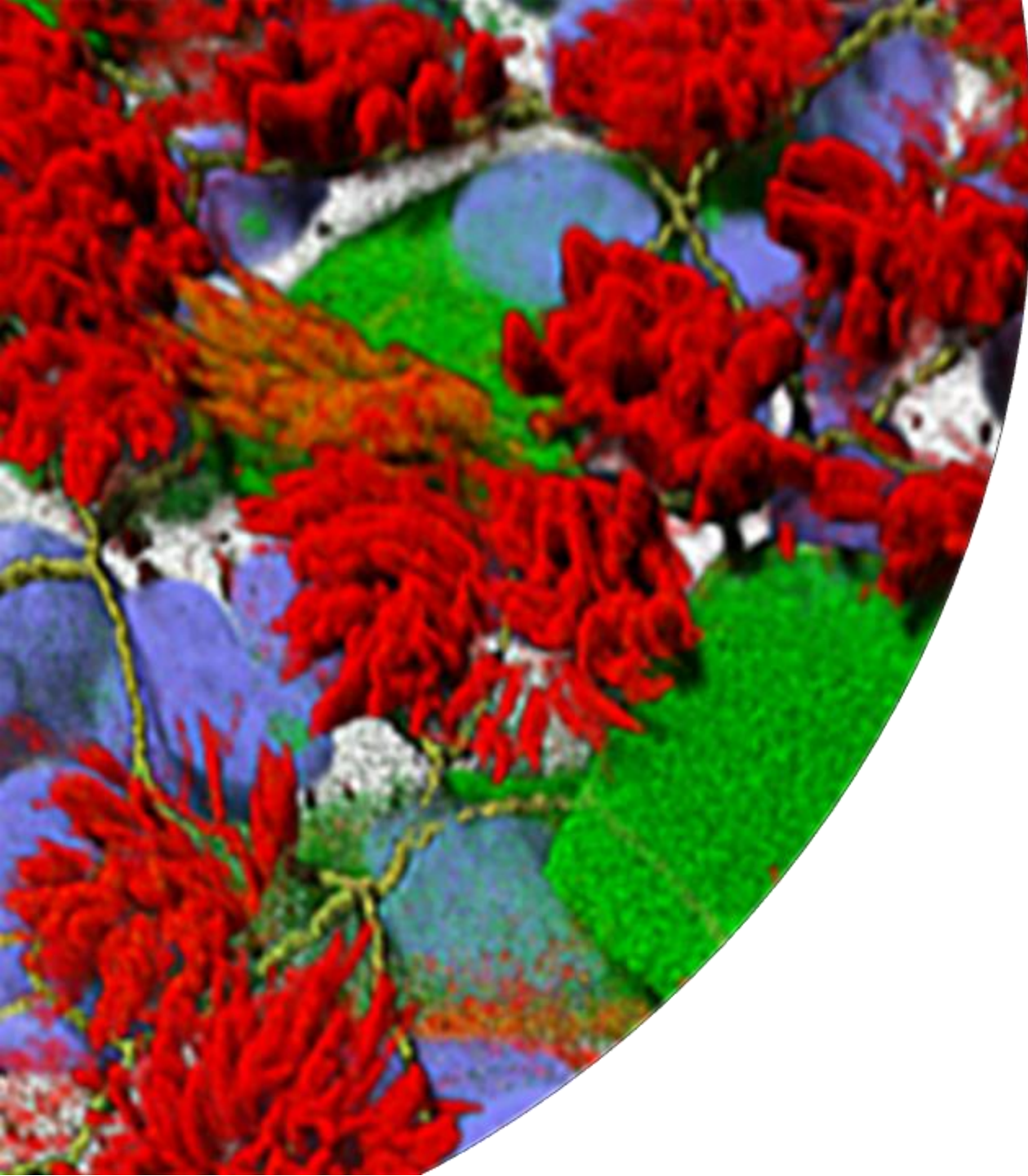




Swine Influenza A virus surveillance in Switzerland from genotype to phenotype

Annual ESFLU meeting

Copenhagen, 25 – 27 March 2025

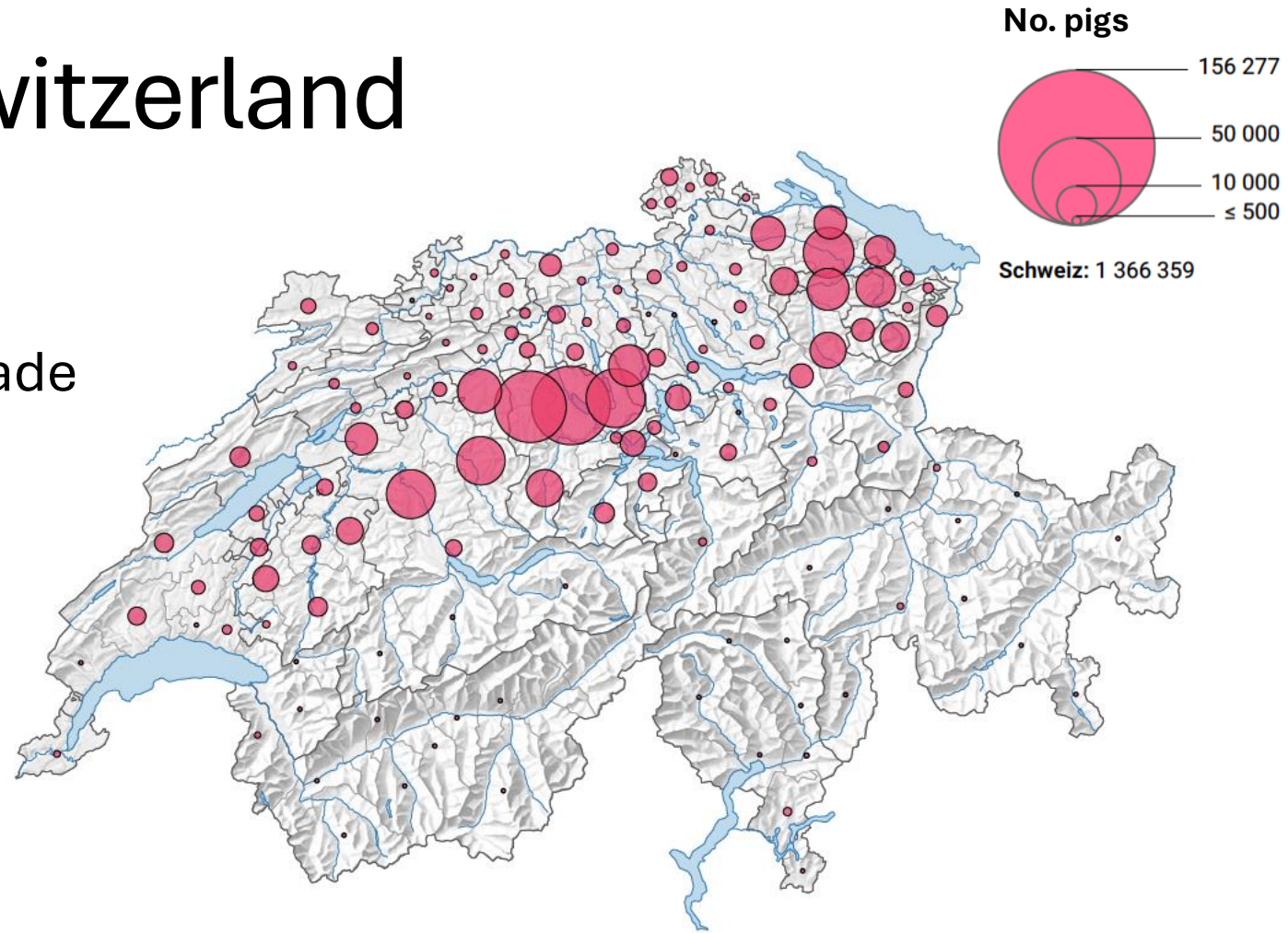
Ronald Dijkman, Ph.D.

u^b

Swine industry in Switzerland

- Strict regulation on live animal trade

Annual Trade (1998-2022)

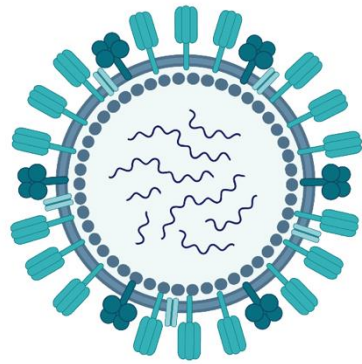


Distribution of (>5500) pig farms in CH

- No active vaccination program

Sources: Swiss Federal Statistical Office (BFS)
Federal Office for Customs and Border Security (FOCBS)
Federal Food Safety and Veterinary Office (FSVO)

swIAV surveillance in Switzerland

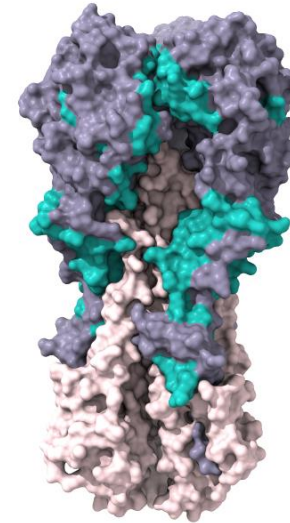


Antigen drift/shift



swIAV surveillance is limited to farms with coughing pigs that are reported to the veterinary authorities

Lechmann et al. medRxiv 2025



Missing information:

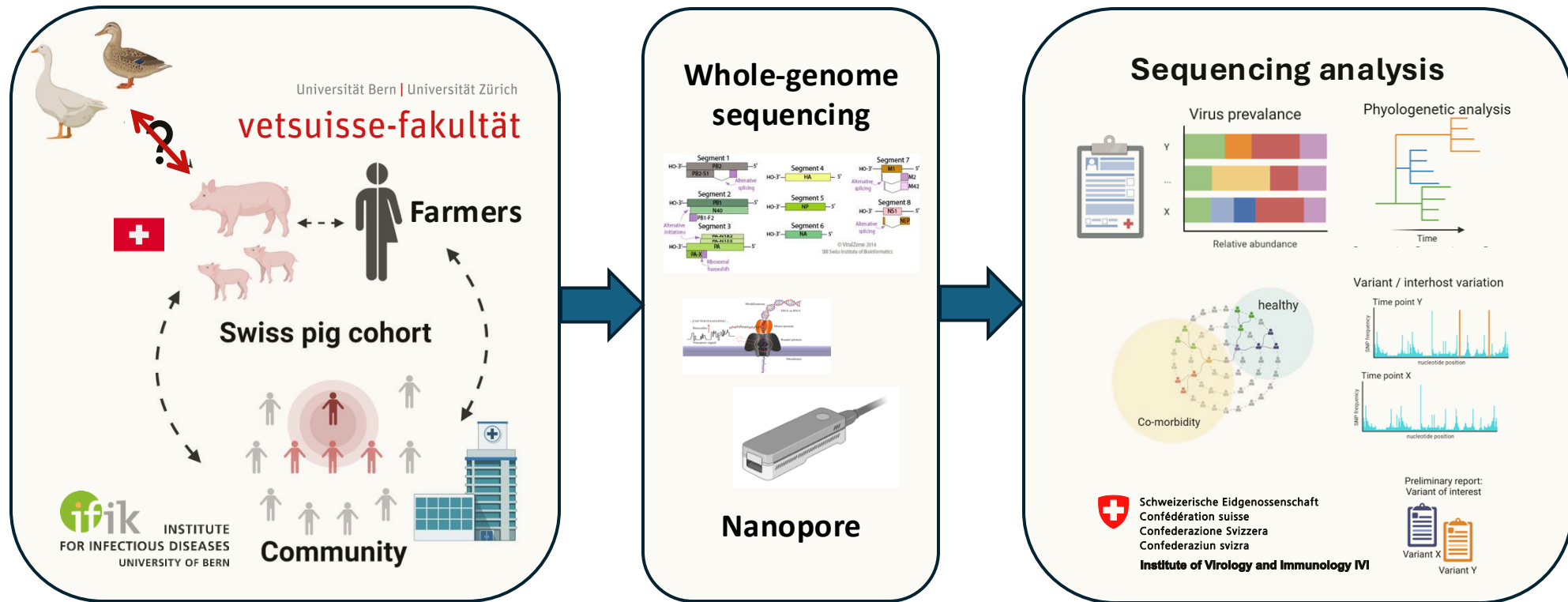
- Antigenic **Sa**, **Sb**, and **Cb** sites
- Receptor binding regions
 - D190/D130 loops

Whole genome information

-  PB2 = Viral replication activity
-  PB1 = PB1-F2 (*pathogenicity marker*)
-  PA = resistance to Baloxovir marboxil
-  HA = receptor tropism & pH stability
-  NP = resistance to human MxA
-  NA = resistance to Zanamivir / Oseltamivir
-  M = viral morphology - respiratory transmission
-  NS = suppression host response

Detailed genomic, molecular, and biological characterisation for swIAV is incomplete.

Genomic Surveillance of IAV in Humans and Swine



Jonas Steiner



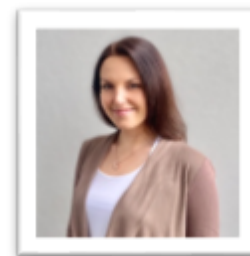
Matthias Licheri



Manon Licheri



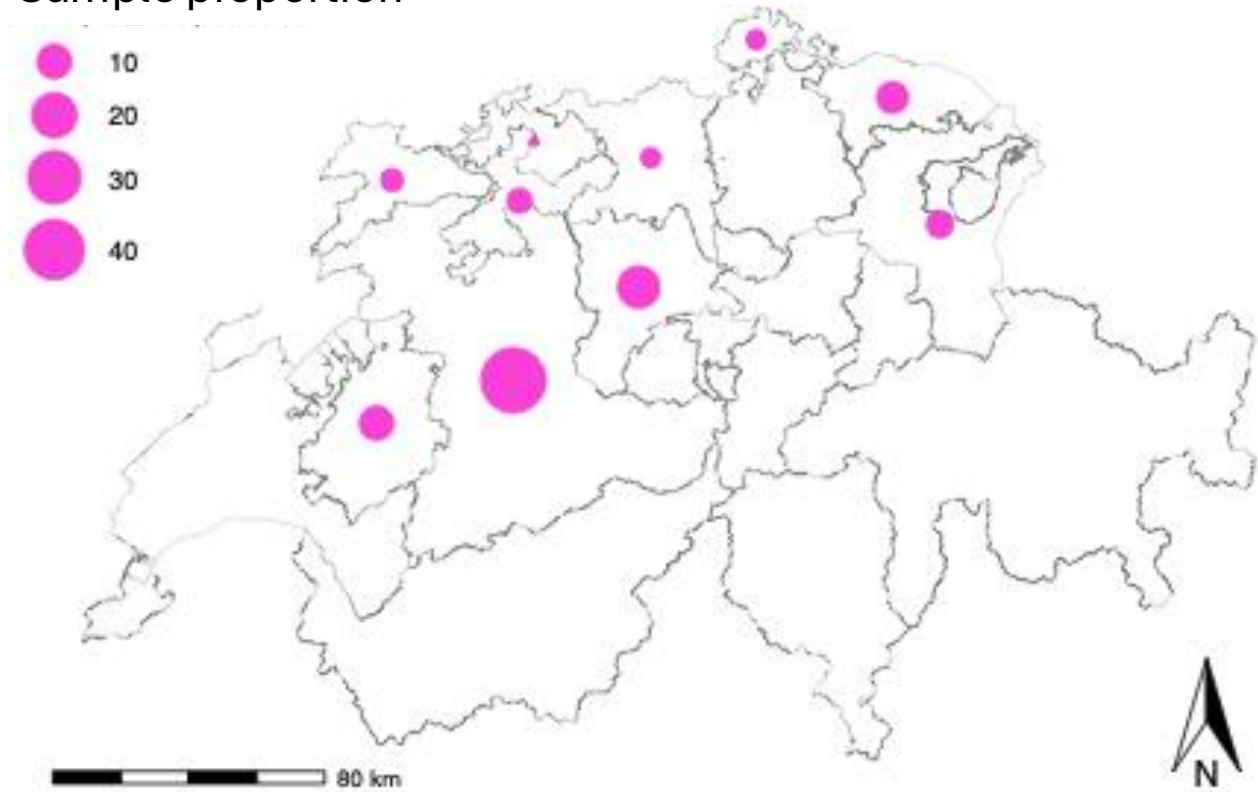
Mike Mwanga



Jenna Kelly

Active swIAV surveillance

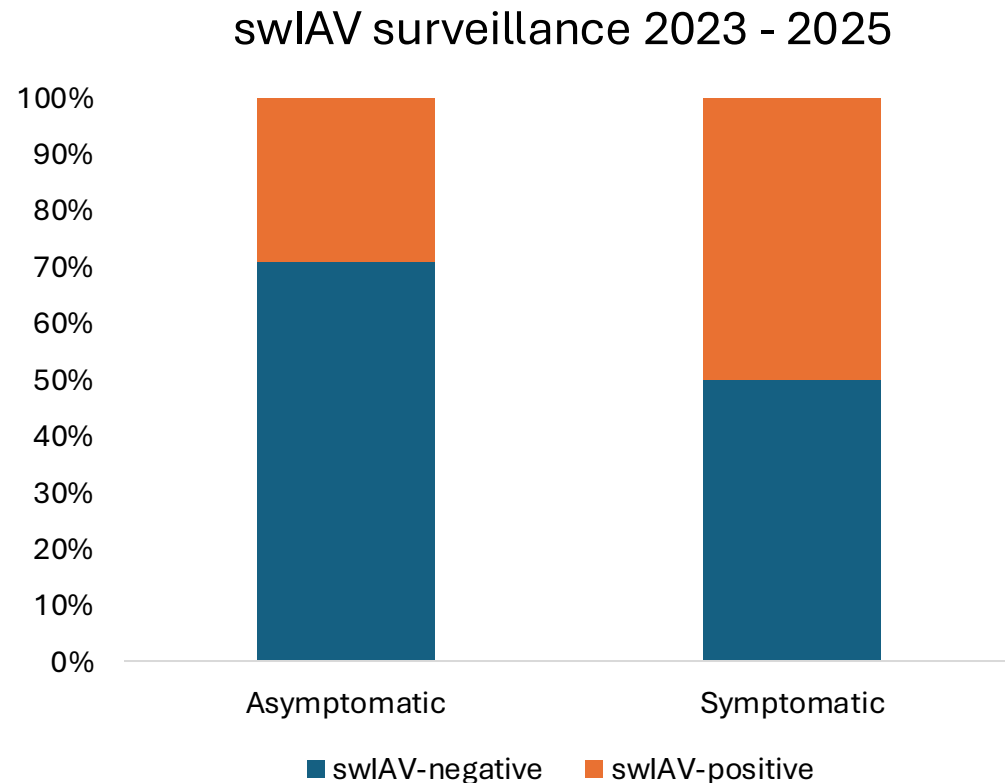
Sample proportion



≥1600 samples from 102 farms analysed (2023 – 2025)

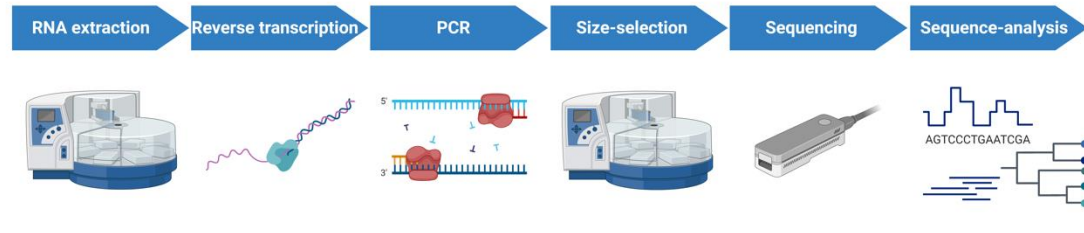
- Voluntarily nasal swab of farm personnel
- Fatteners and weaners

Active swIAV surveillance

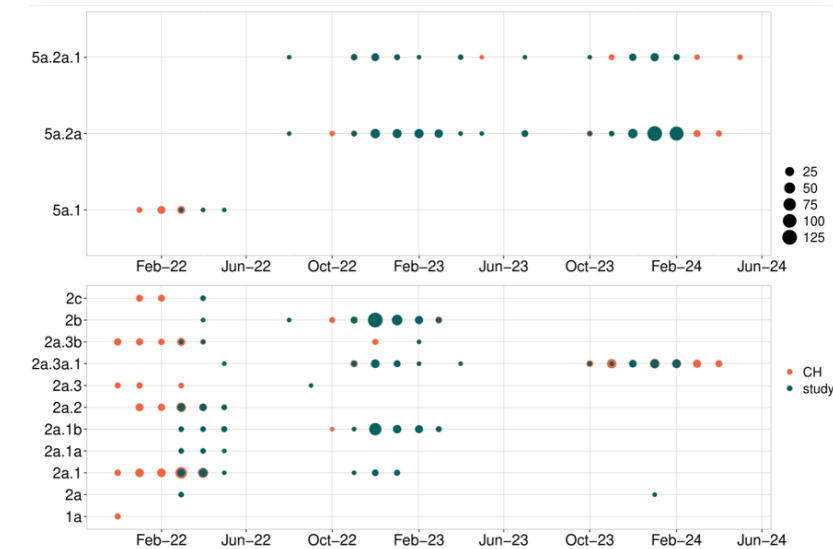
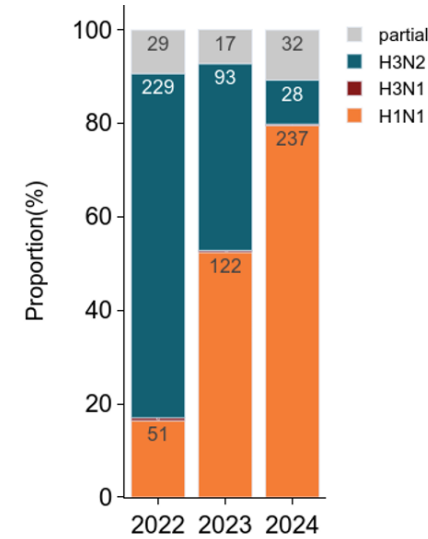
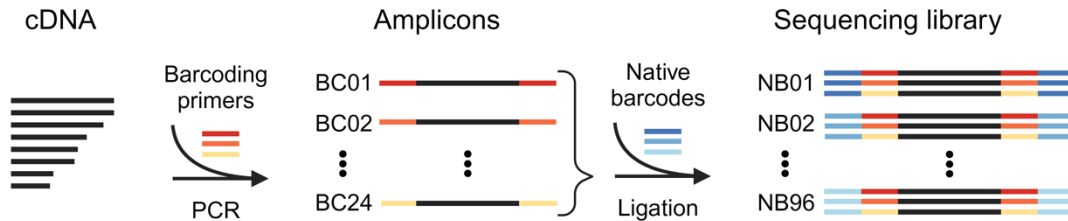


- Prevalence of swIAV in asymptomatic pigs
 - ~ 30% of Swine farms are positive
- First description of swIAV prevalence in asymptomatic pigs in Switzerland
- 143 qRT-PCR swIAV-positive samples
 - 40 have been analysed with WGS

Optimized IAV WGS approach



Increased sensitivity, works on diverse avian, swine and human subtypes

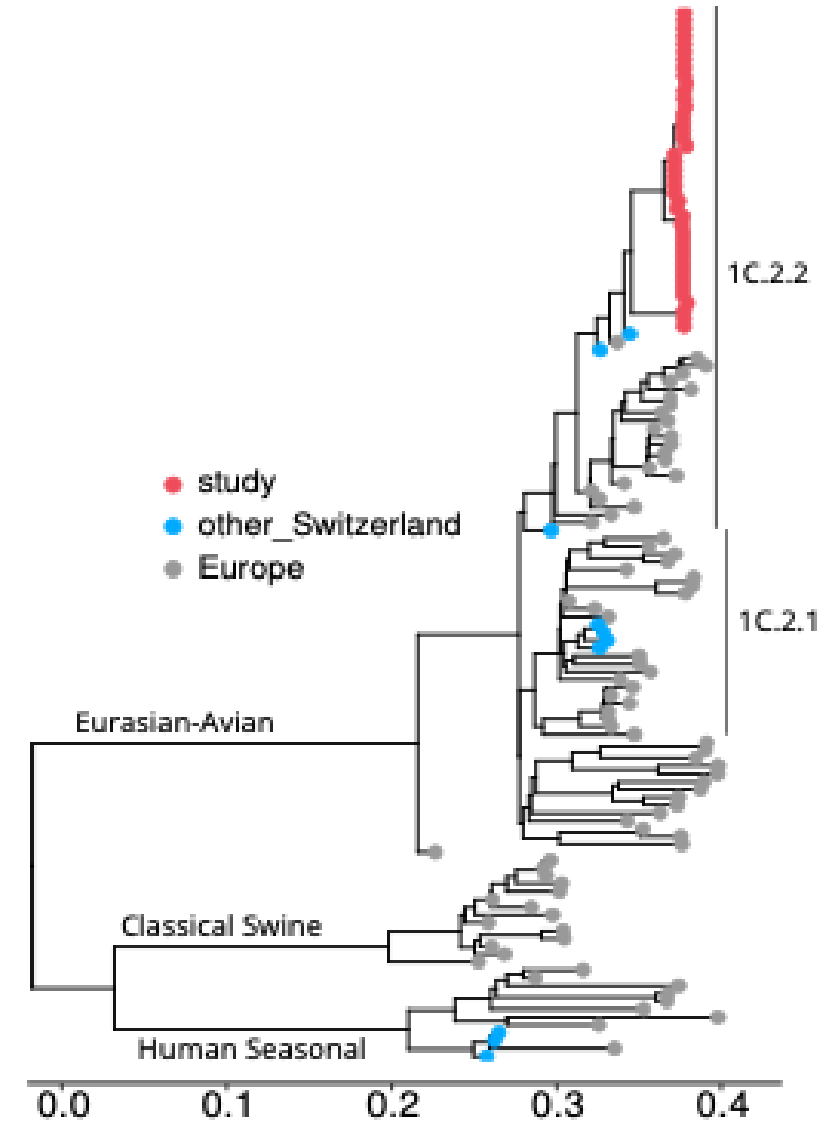


Scalable and high throughput WGS of IAV

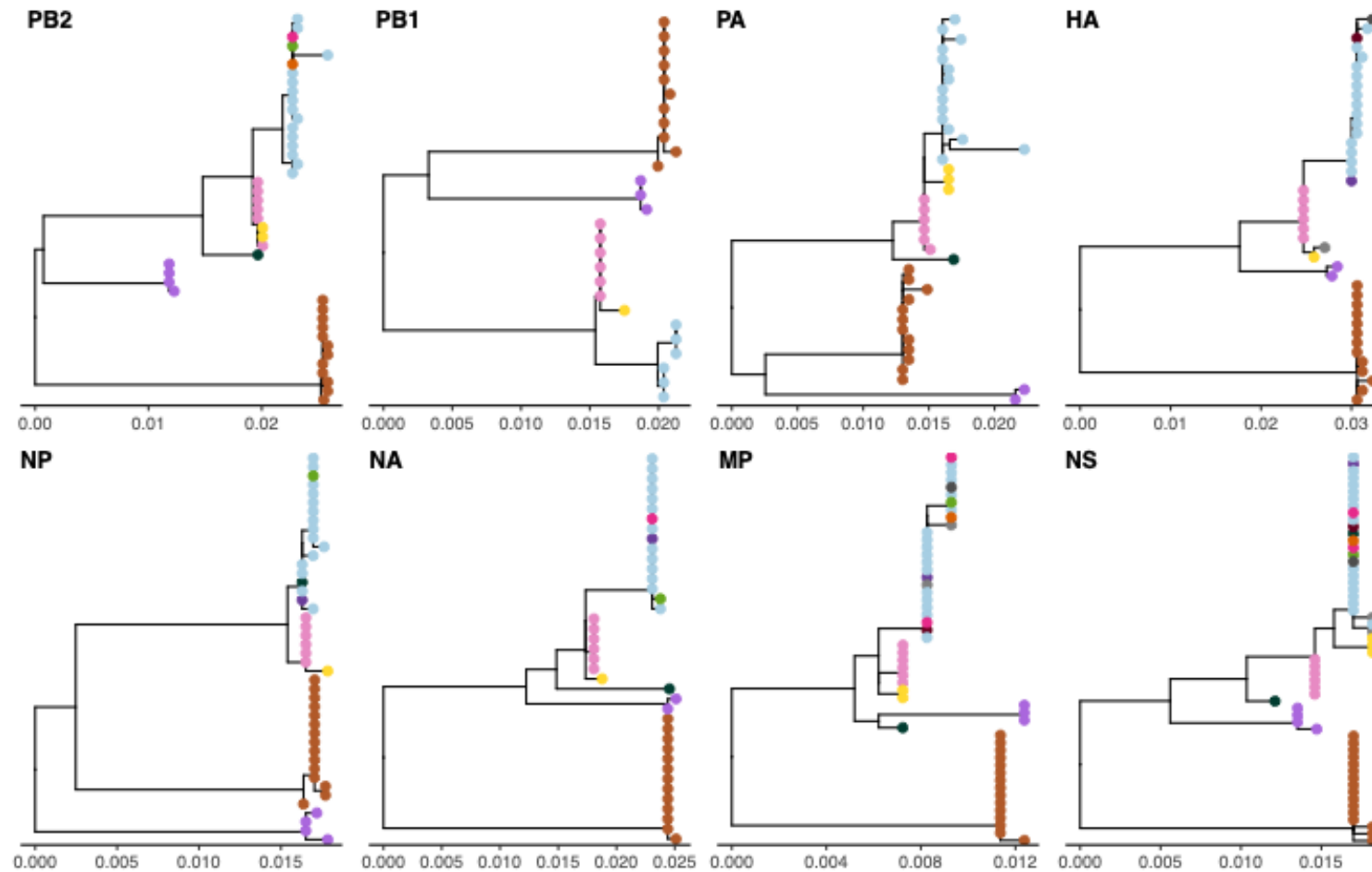
- NGS cost reduction ≥ 8 -fold

Phylogenetic analysis

- Phylogenetically distinct swlAV strains from the rest of Europe
- Two distinct 1C.2.2 clusters
- **Unique swlAV evolution**

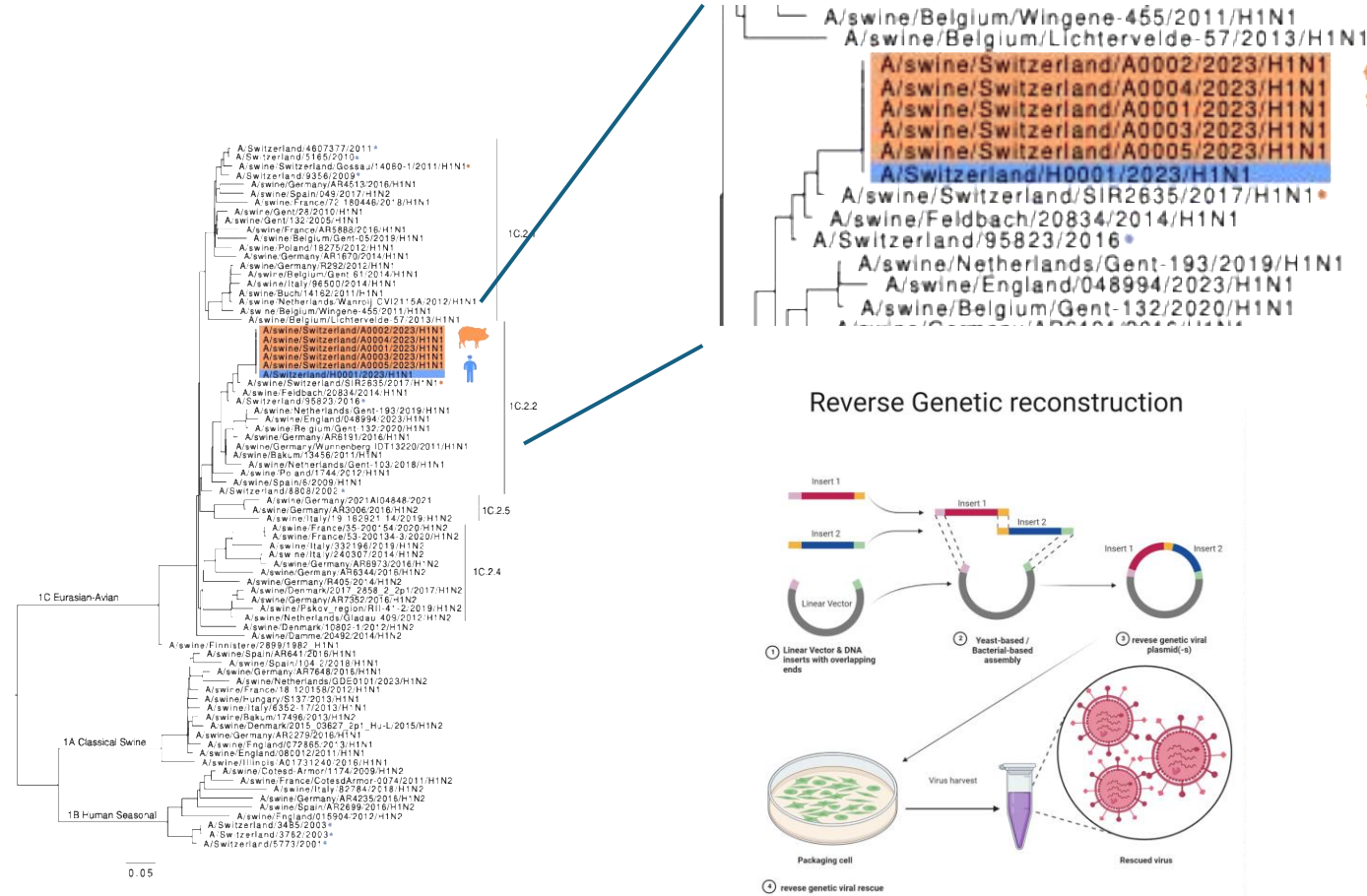


Phylogenetic analysis

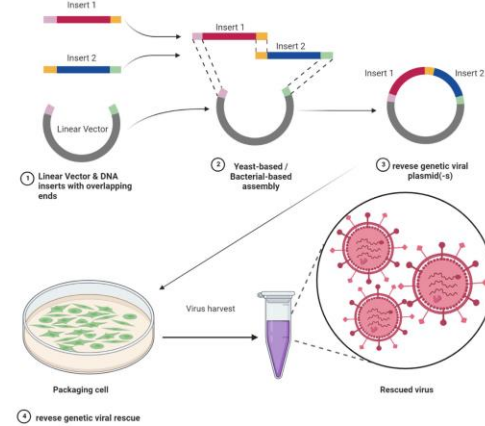


Heterogeneity among genomic segments and swine farms

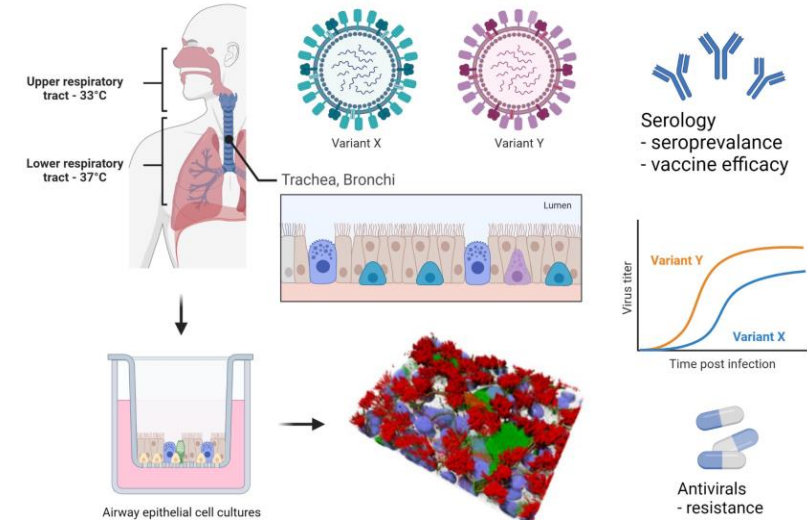
A curious case of swlAV



Reverse Genetic reconstruction



Biological characterization



In primary human & swine AEC models

Summary

- Active genomic surveillance of swIAV with WGS genotypic characterization
- Circulation of swIAV in symptomatic and asymptomatic pigs
- Swiss-specific swIAV evolution
 - With possible Cantonal differences
- Identification of a potential zoonotic event
- Characterising IAV from genotype to phenotype to generation of a biologically accurate risk profile.

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Confédération suisse
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Confederaziun svizra

Federal Food Safety and Veterinary Office



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SCHWEIZERISCHER NATIONALFONDS
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SWISS NATIONAL SCIENCE FOUNDATION

STIFTUNG
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