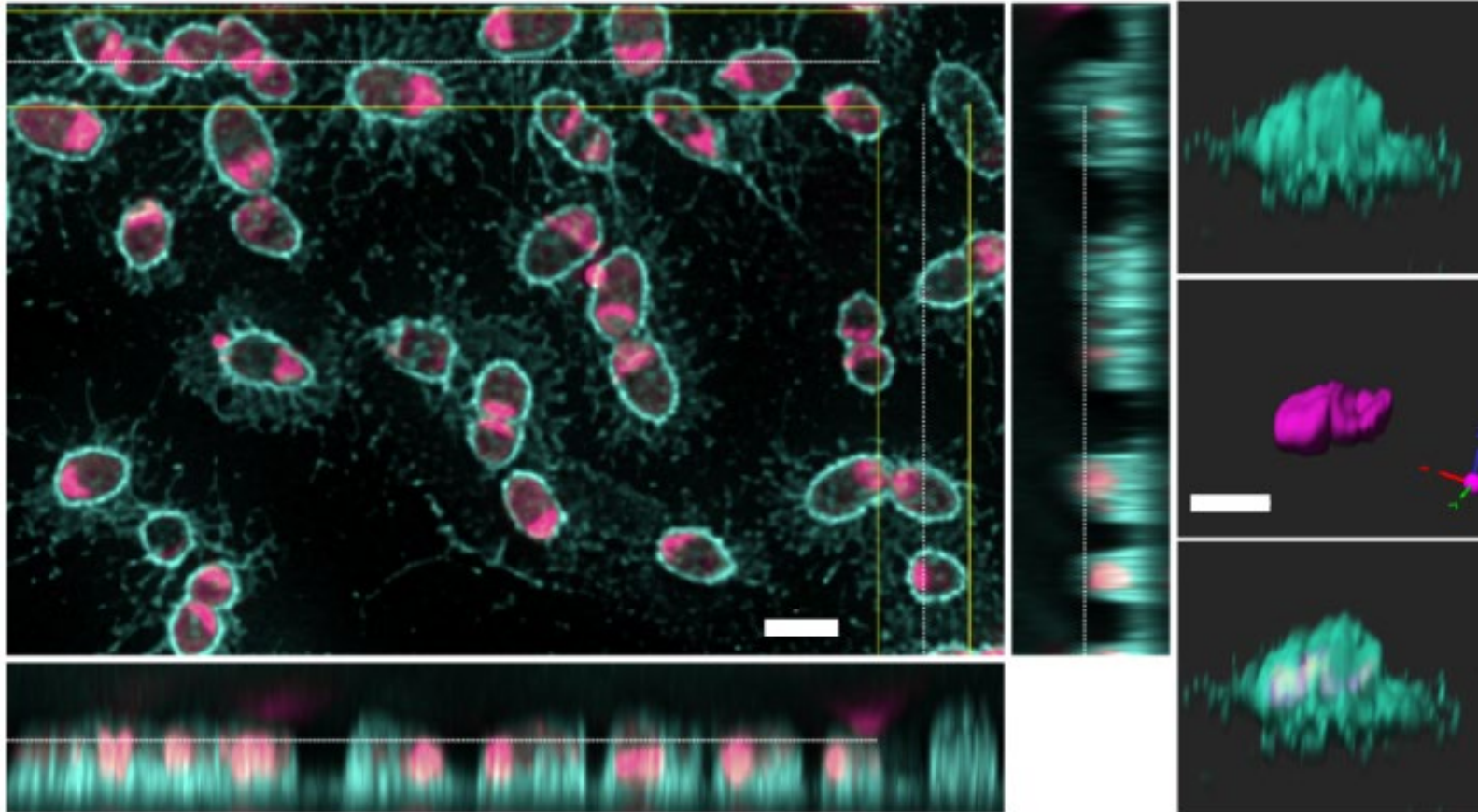


CAZyme activities of *Akkermansia muciniphila*

Dr Cassie Bakshani
CBM15



Davey et al. 2023



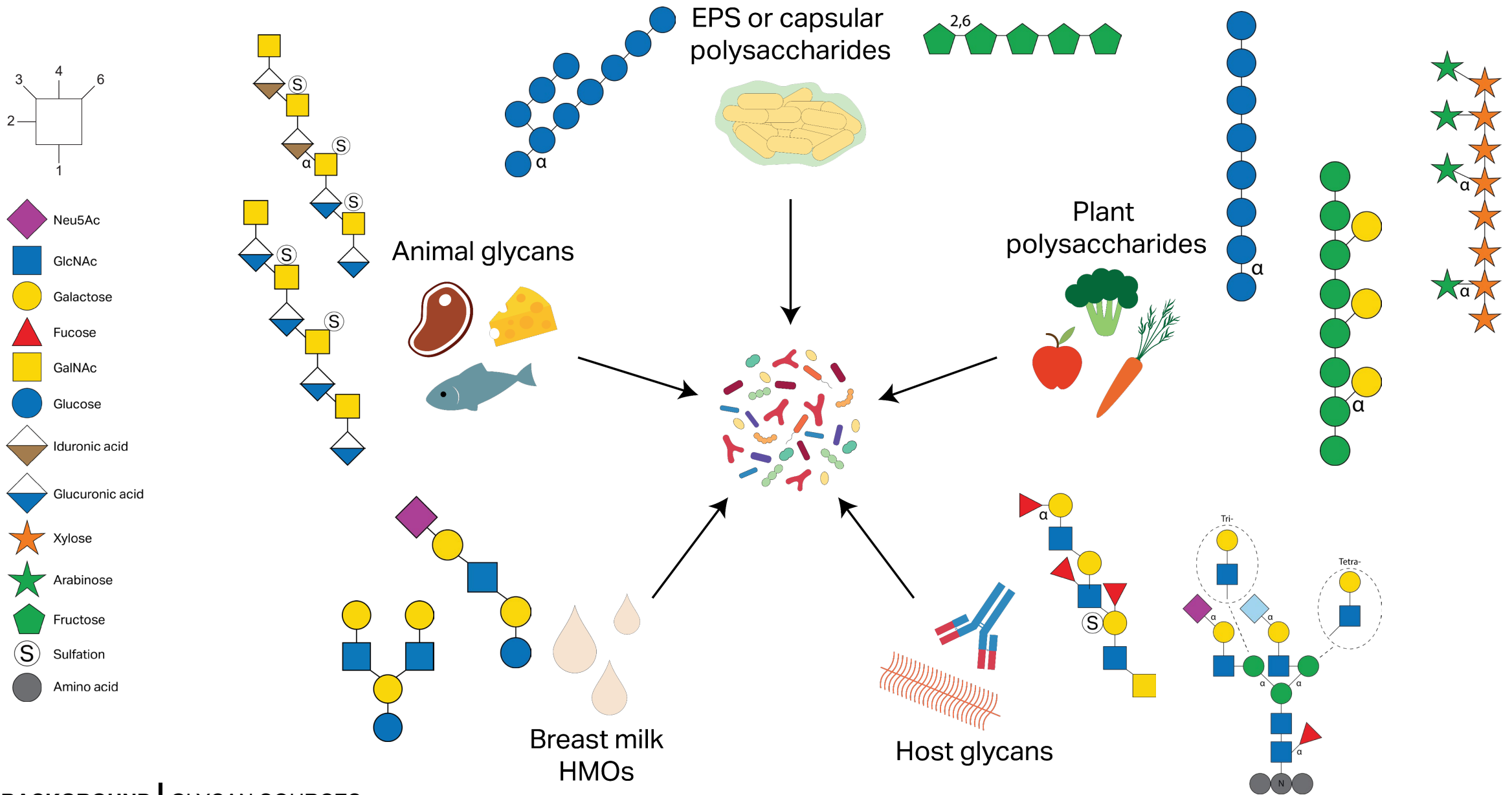
UNIVERSITY OF
BIRMINGHAM

Institute of
Microbiology
and Infection

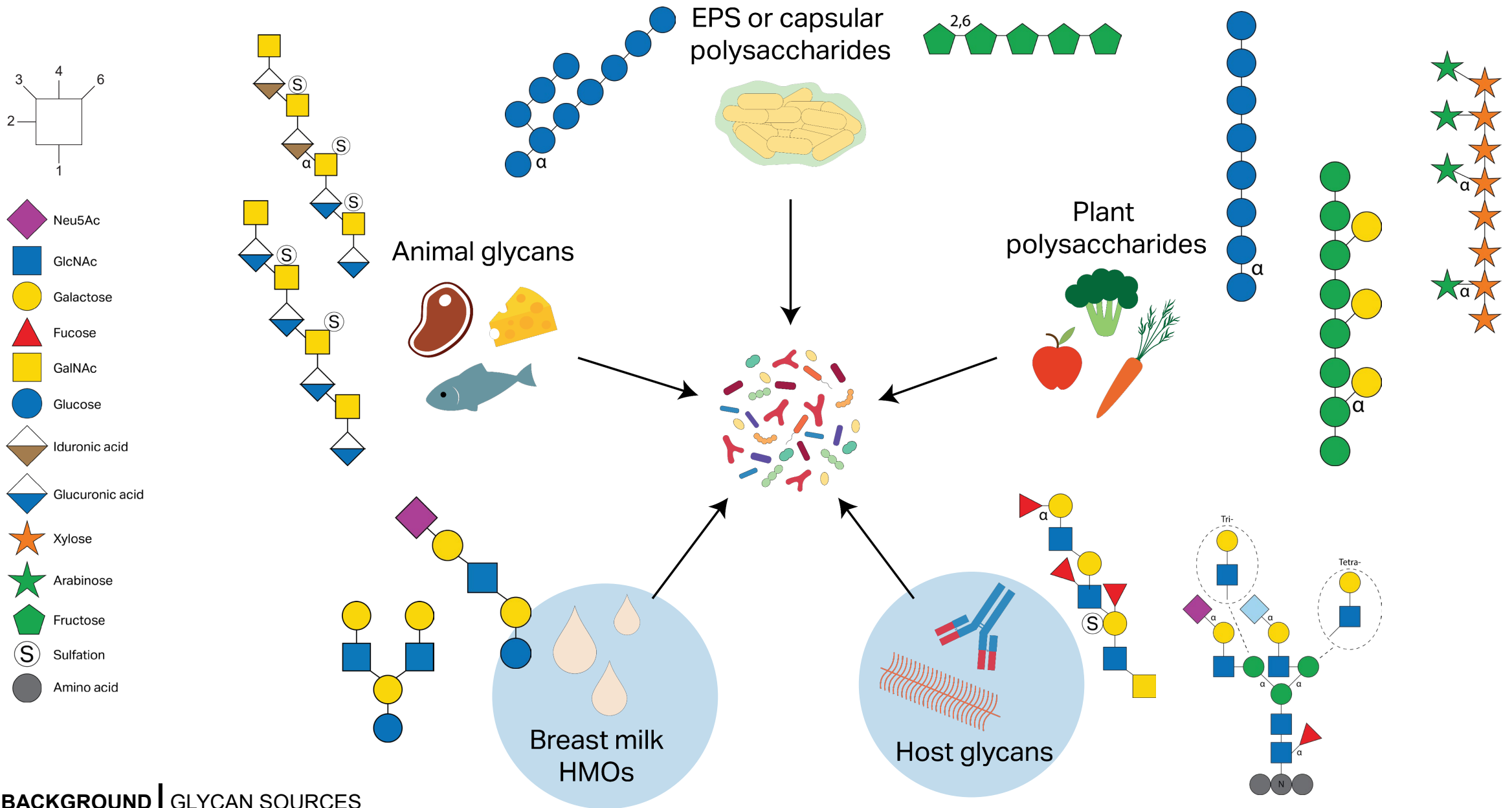
c.r.bakshani@bham.ac.uk
X @CassieBakshani



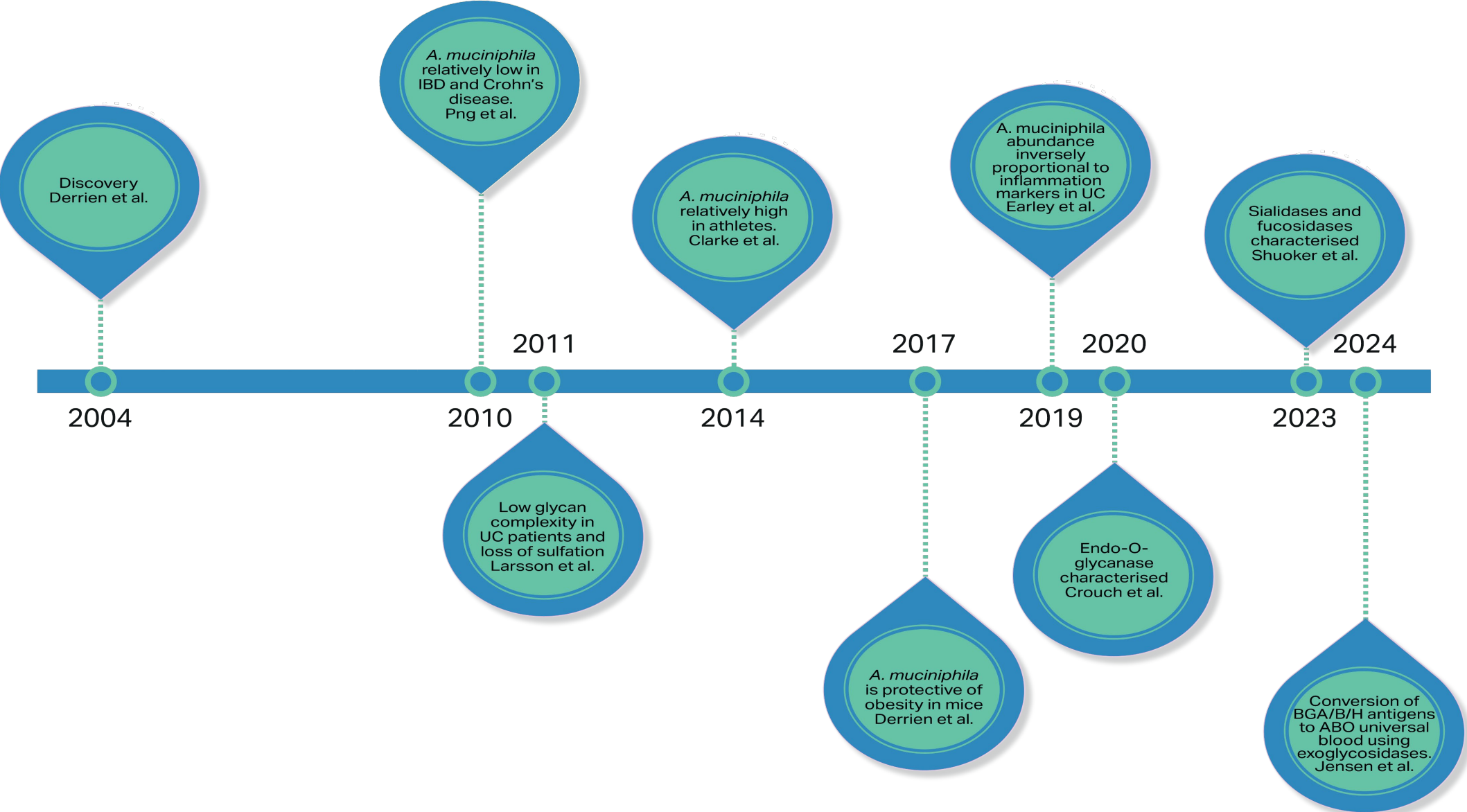
Feeding the gut microbiota



Feeding the gut microbiota



20 years of *Akkermansia muciniphila*

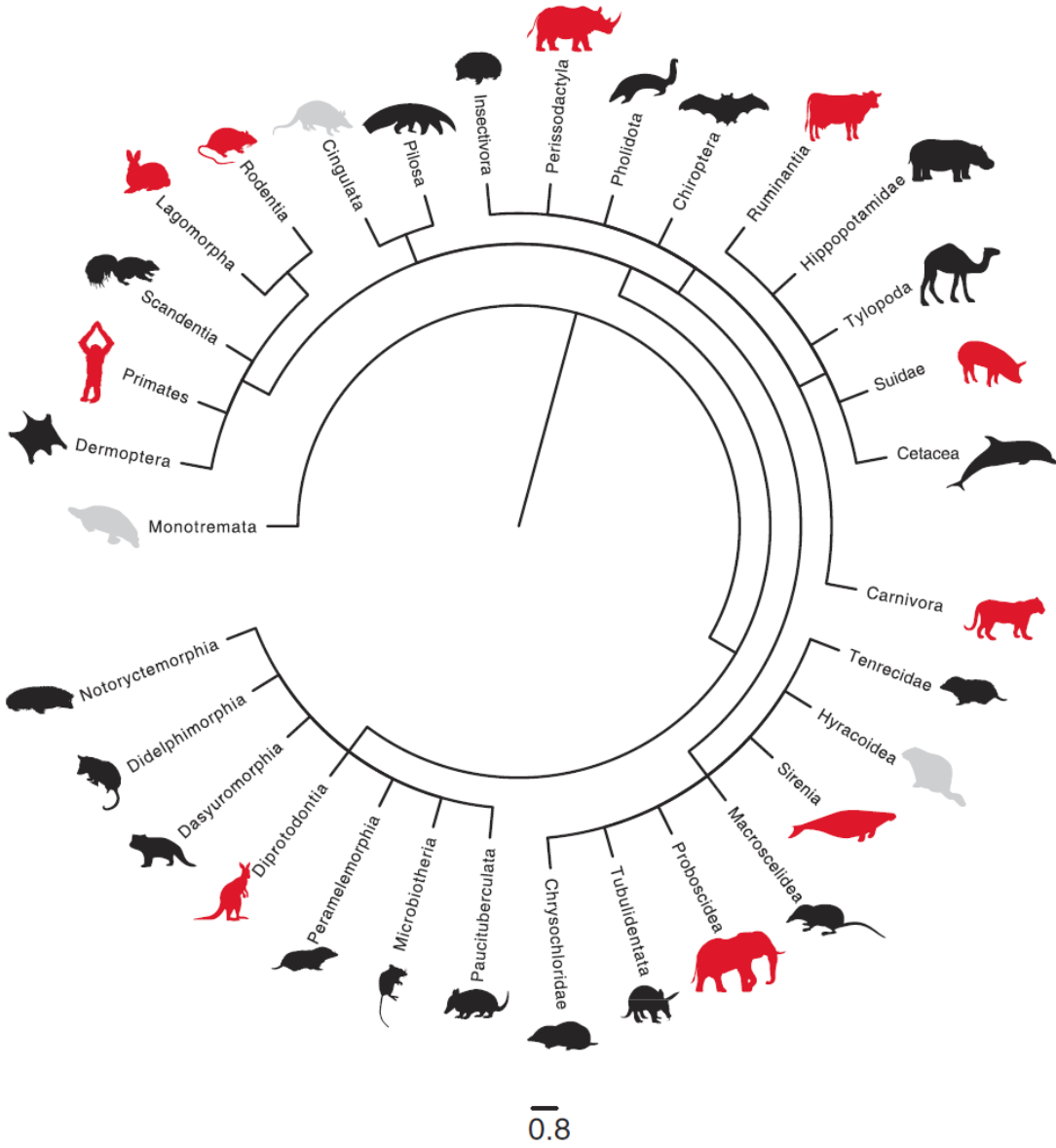


A long evolutionary history

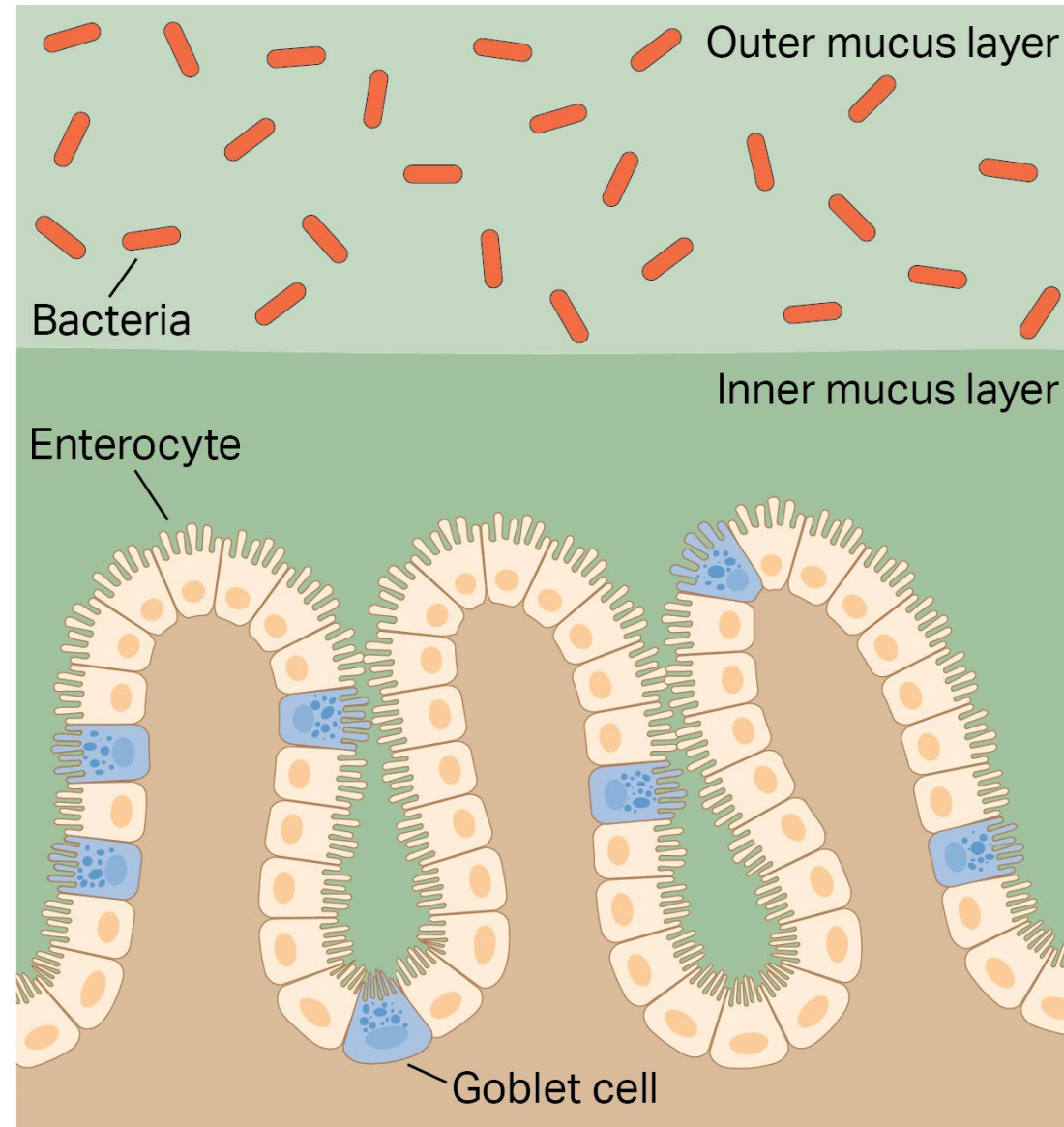
Akkermansia-like sequences

No sequences

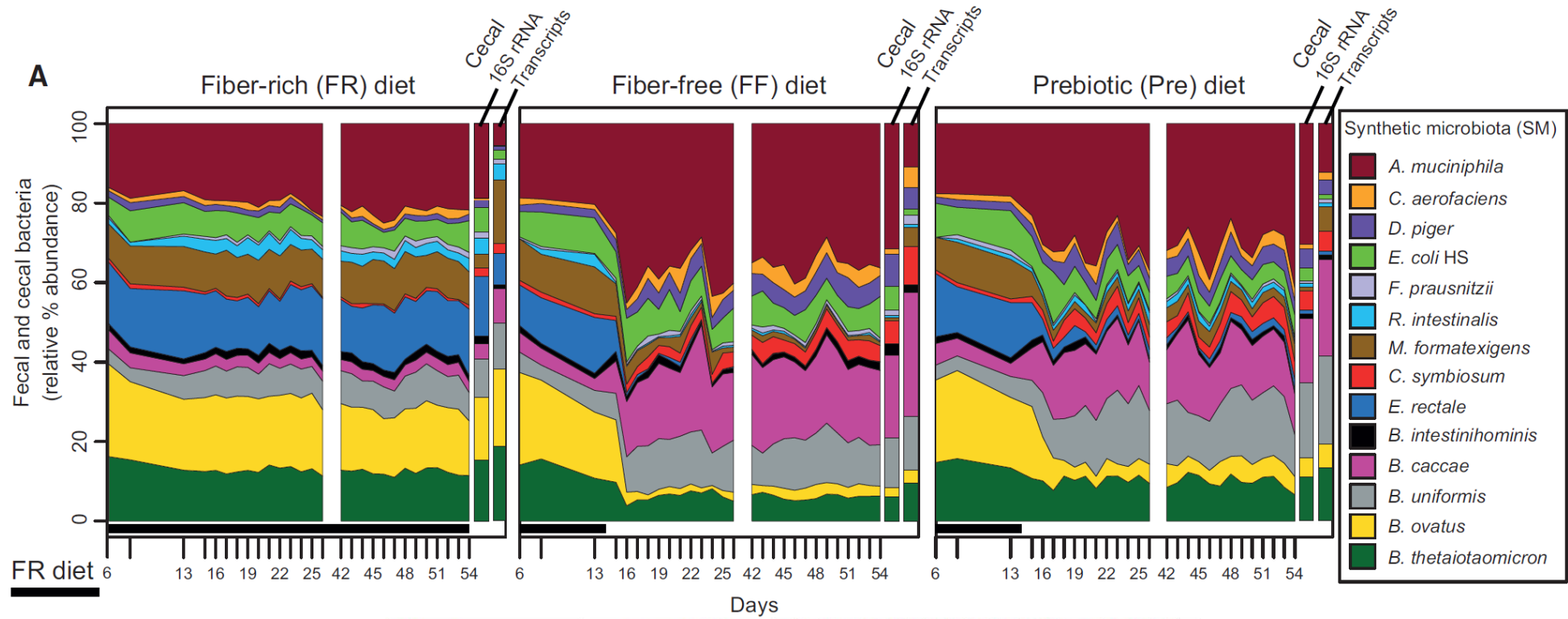
Not tested



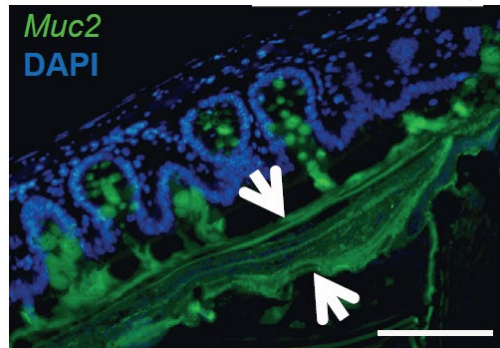
Mucus layers in the colon



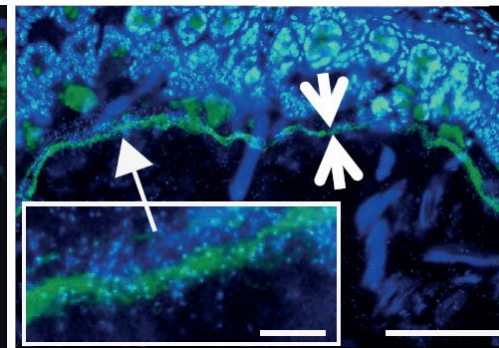
No fibre? No problem



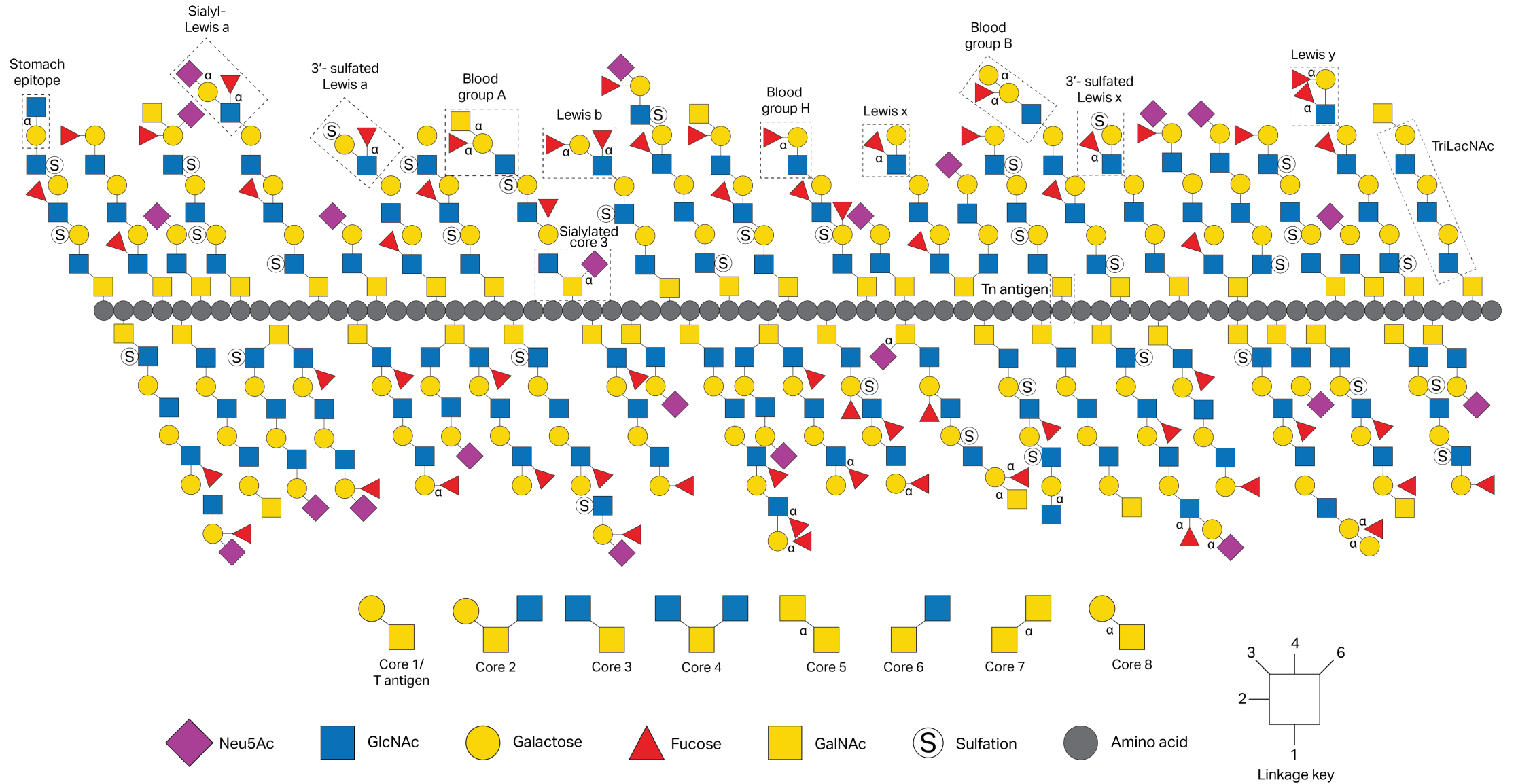
Fibre rich



Fibre free

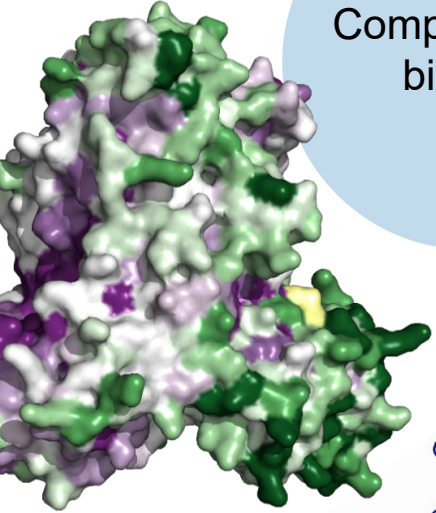


Mucins are complex

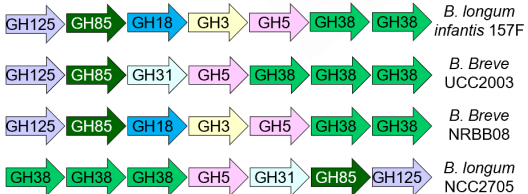


Techniques applied

Computational biology



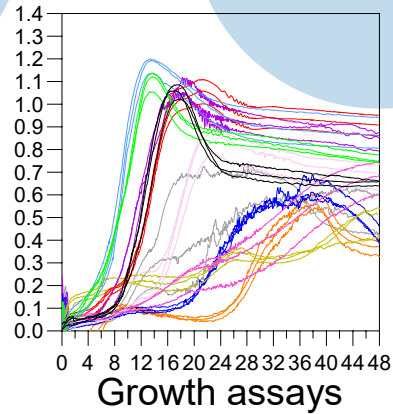
Structure/function relationships



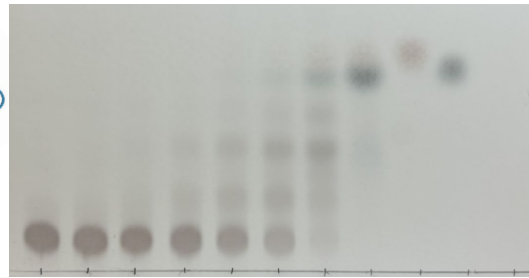
Module prediction

METHODS | SCREENING APPROACH

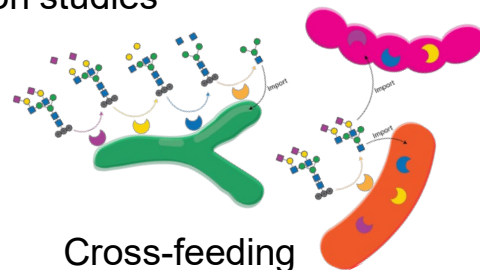
Biology



Growth assays

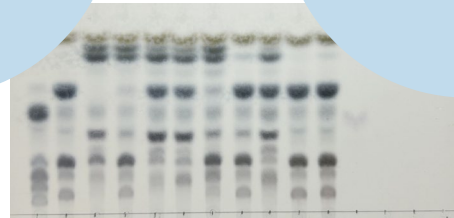


Localisation studies

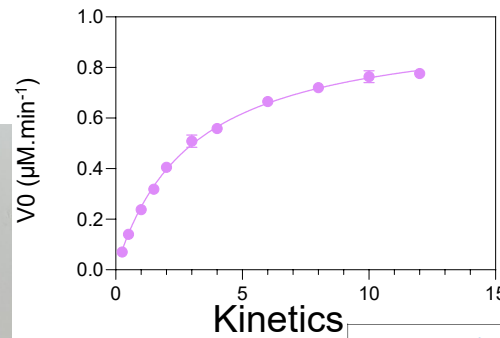


Cross-feeding

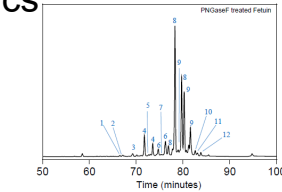
Enzymology



Thin layer chromatography

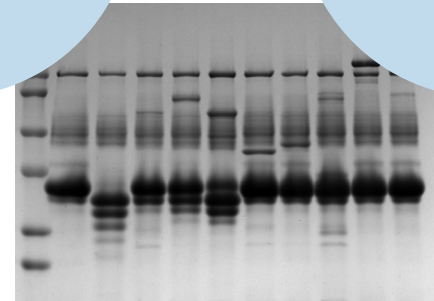


Kinetics

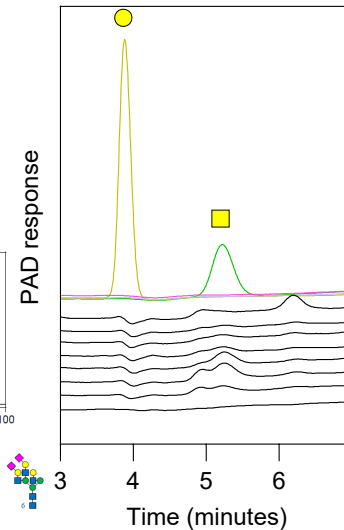


LC-ESI-MS/MS

Bioinformatics



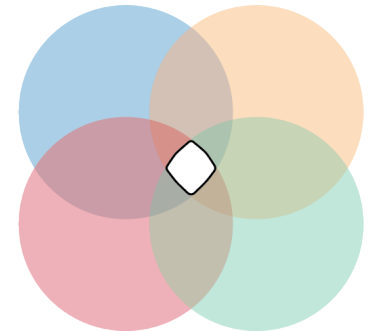
SDS-PAGE



HPAEC-PAD

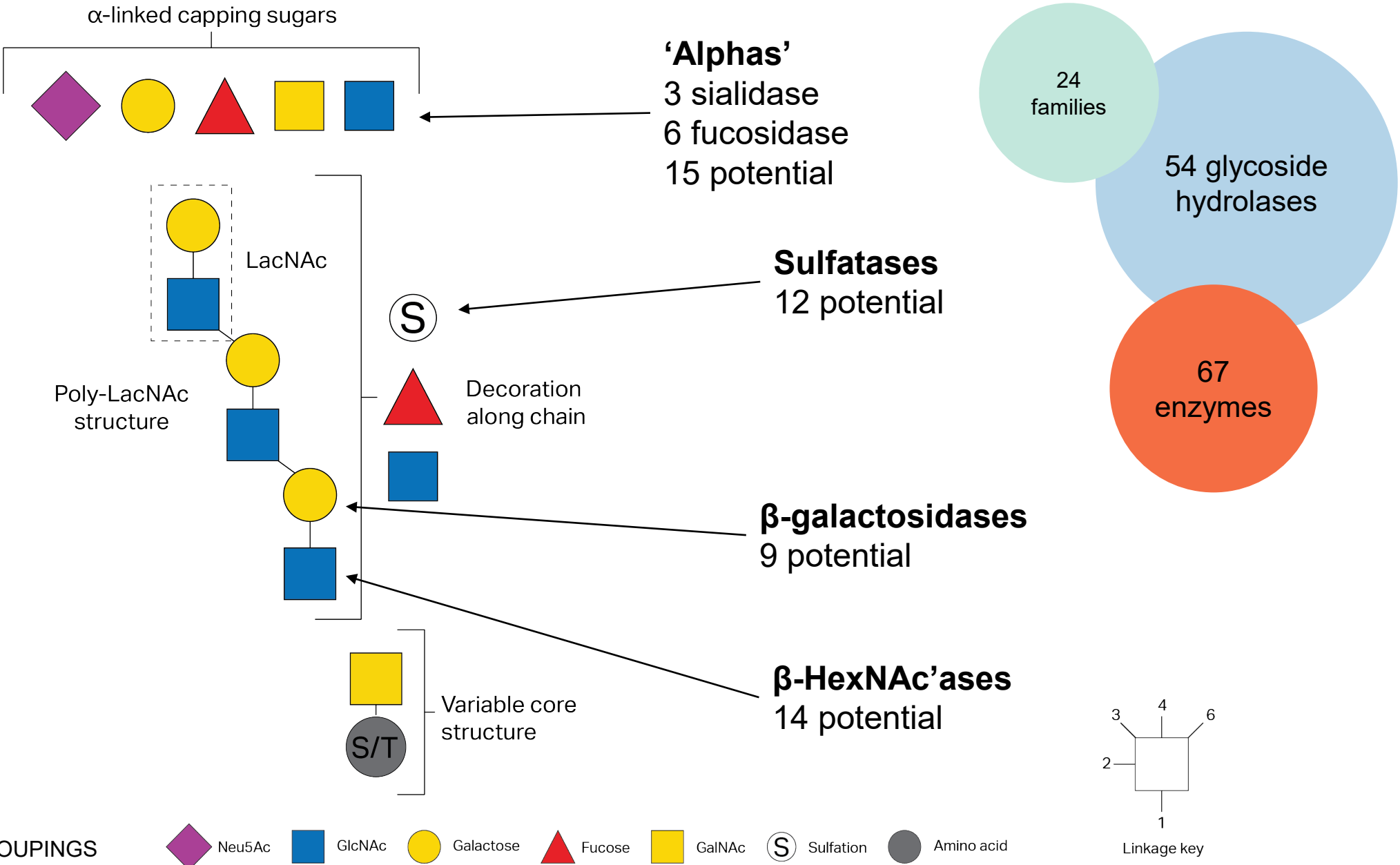


Phylogenetics



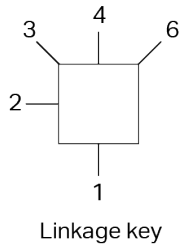
Pangenome analysis

Akkermansia muciniphila CAZymes



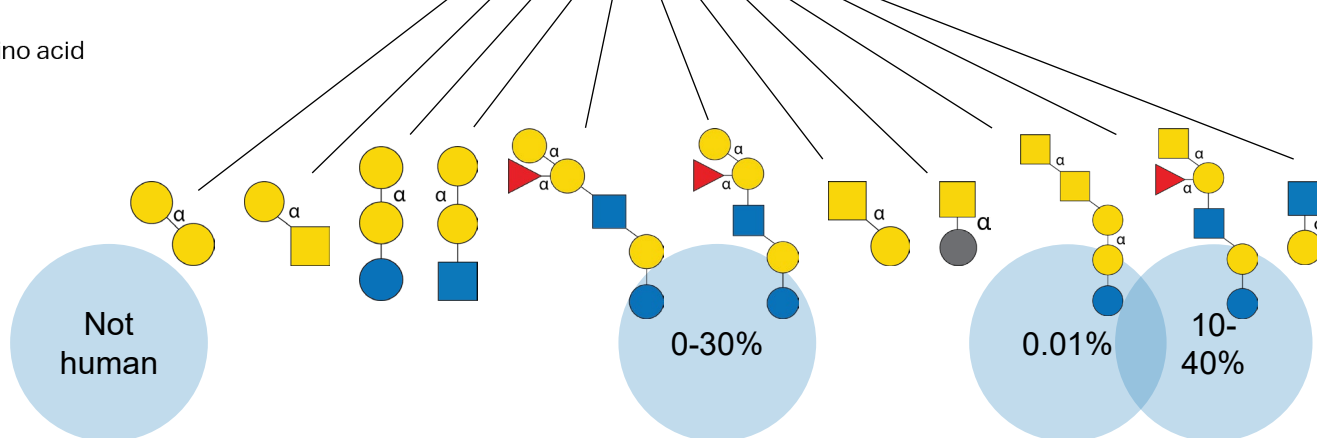
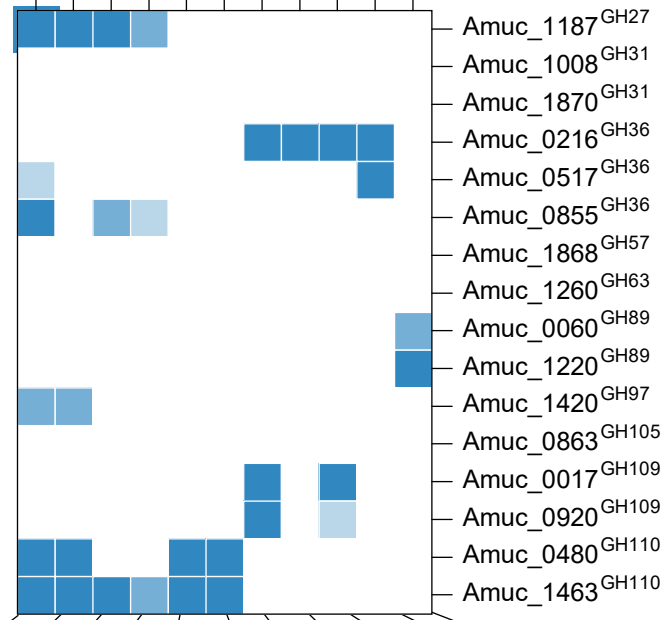
Screening for α -Gal, α -GalNAc and α -GlcNAc activities

Defined oligosaccharides



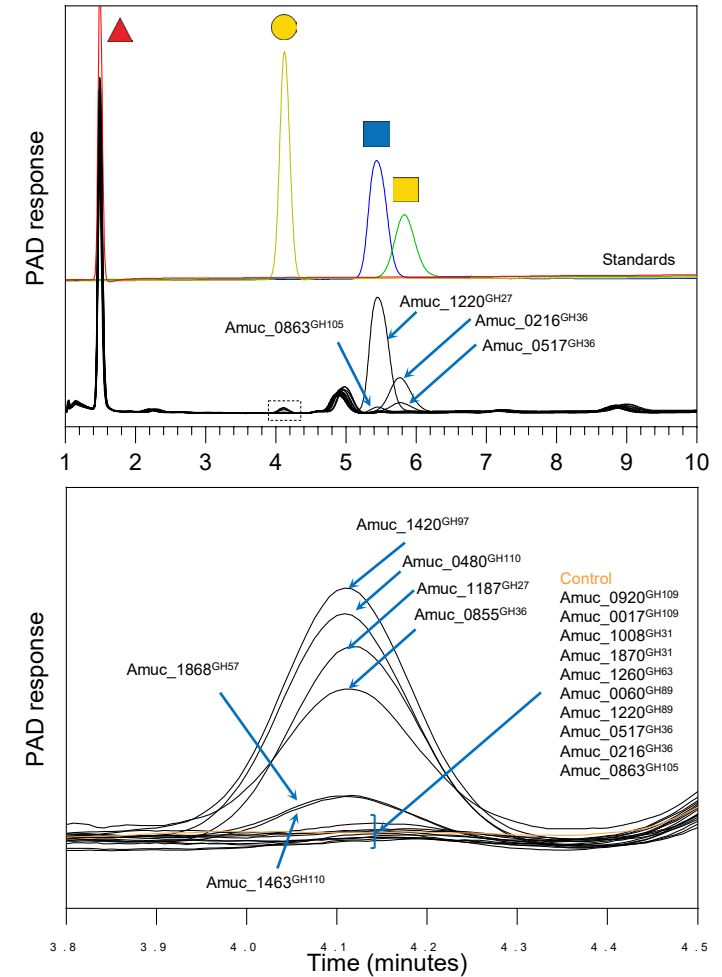
- GlcNAc
- Galactose
- Fucose
- GalNAc
- Amino acid

GalII
Gal α 1,3GalNAc
Globotriose
P1 antigen
Blood group B I (hexa)
Blood group B II (hexa)
GalNAc α 1,3Gal
Tn antigen
Forsman antigen
Blood group A II (hexa)
GlcNAc α 1,4Gal

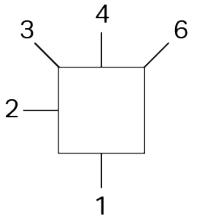
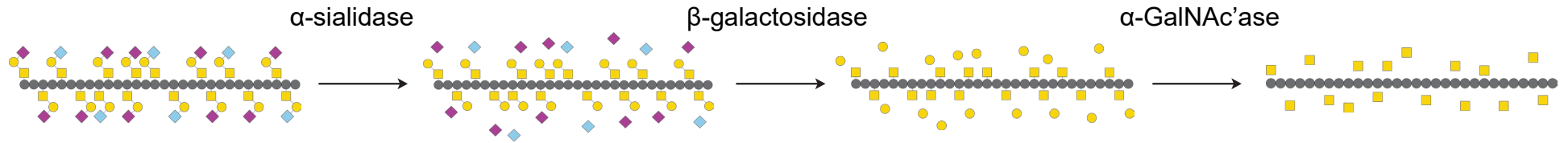


Porcine gastric mucin

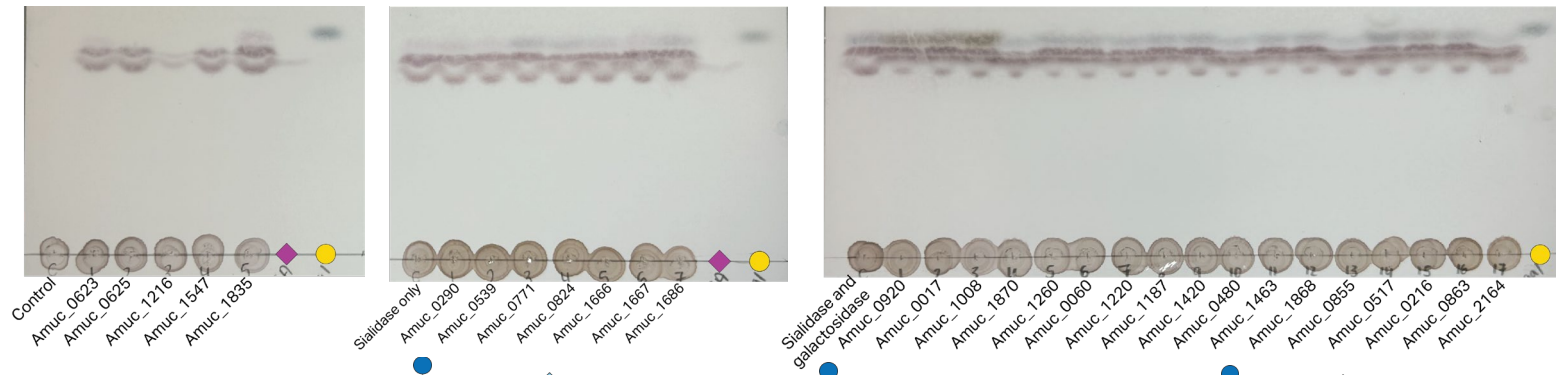
High-performance anion exchange chromatography



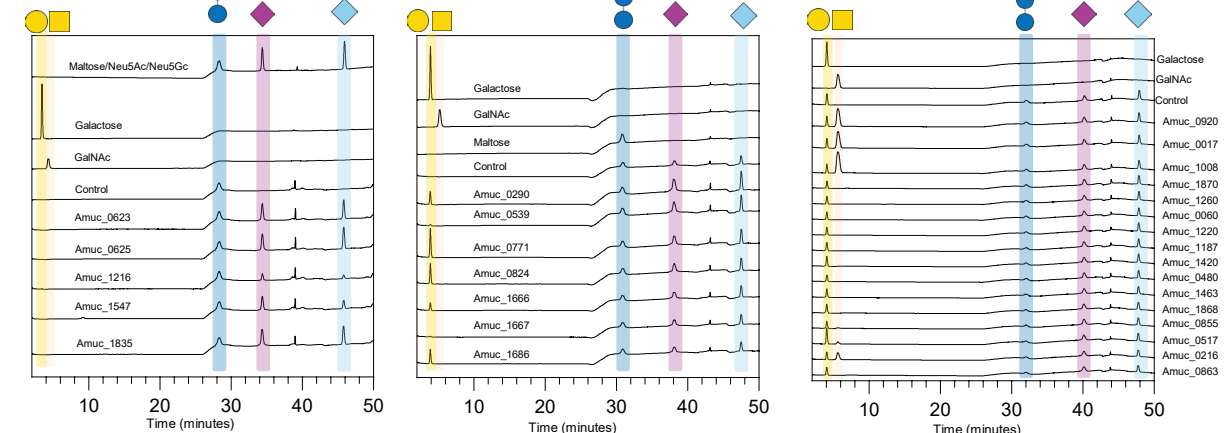
Bovine submaxillary mucin O-glycans



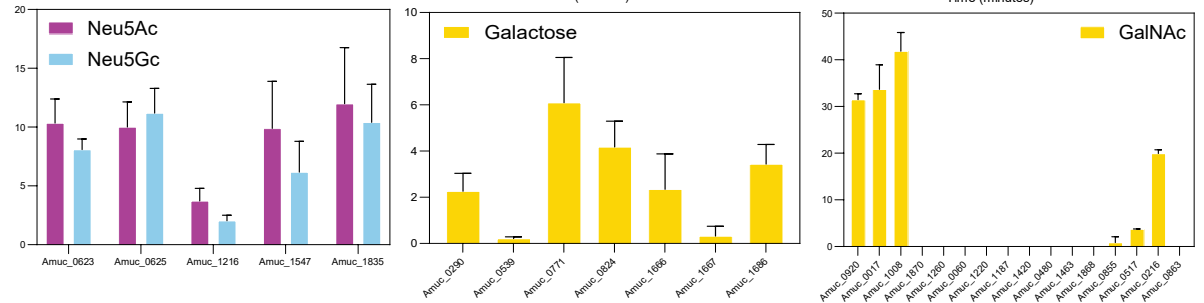
- Linkage key
- Neu5Gc
 - Neu5Ac
 - Galactose
 - Maltose
 - GalNAc



Thin layer chromatography

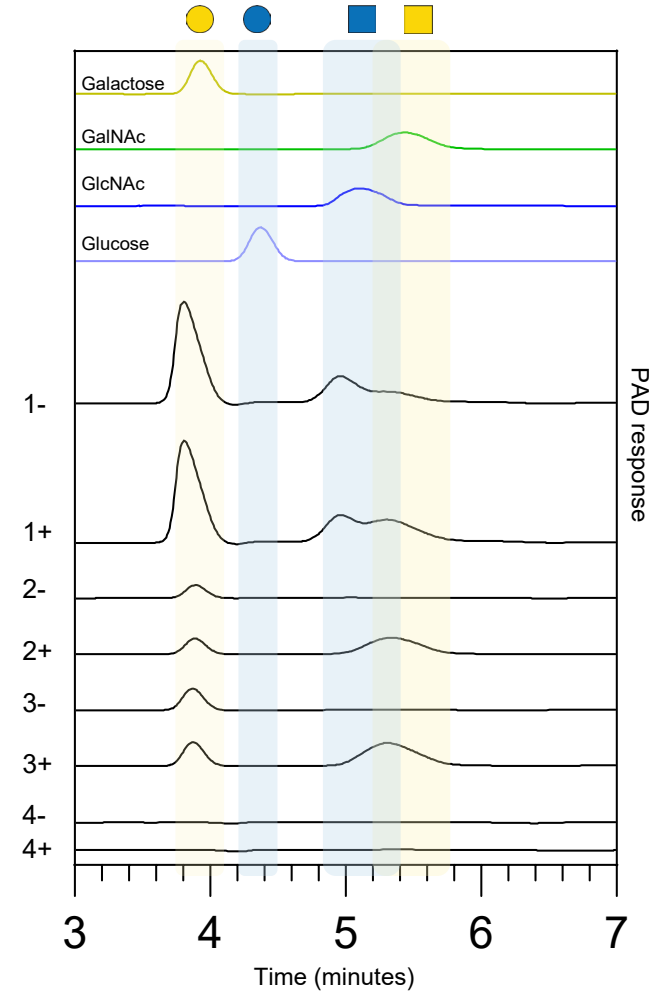
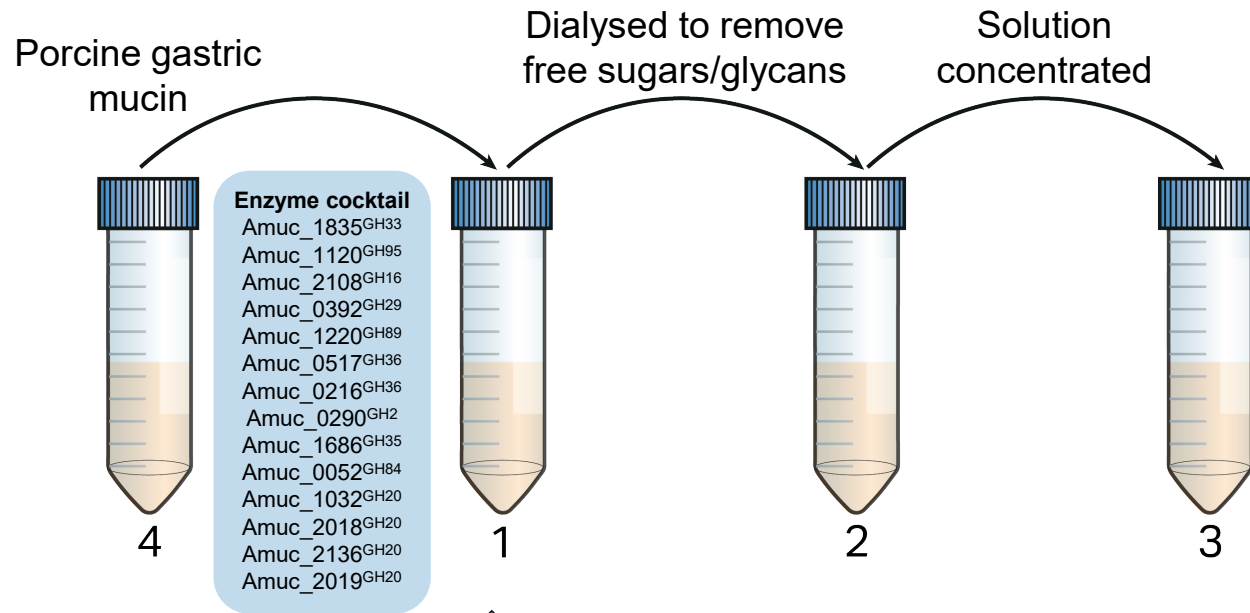


HPAEC-PAD

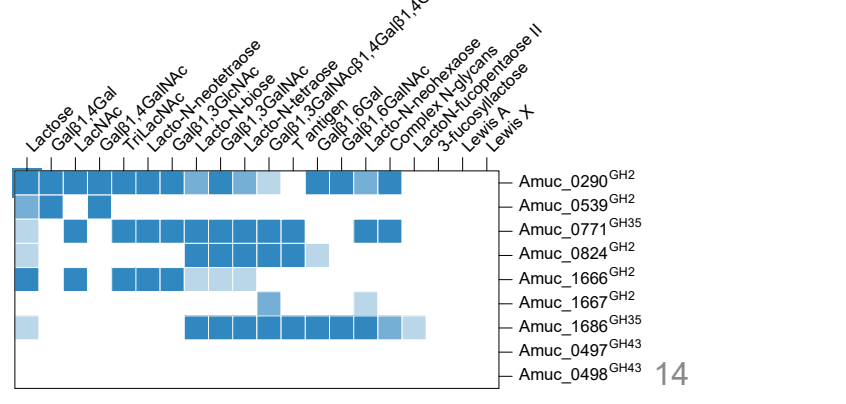
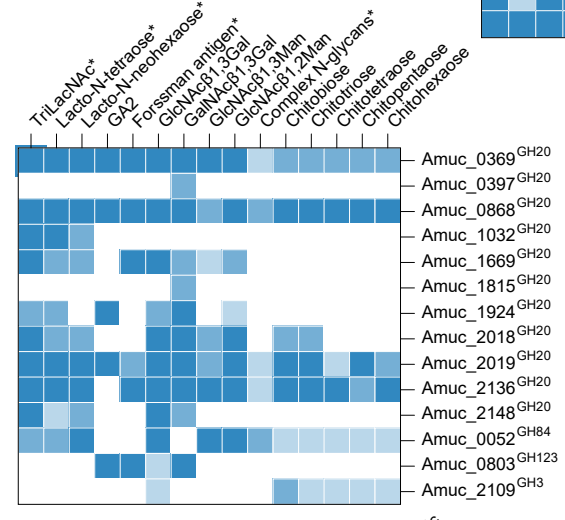
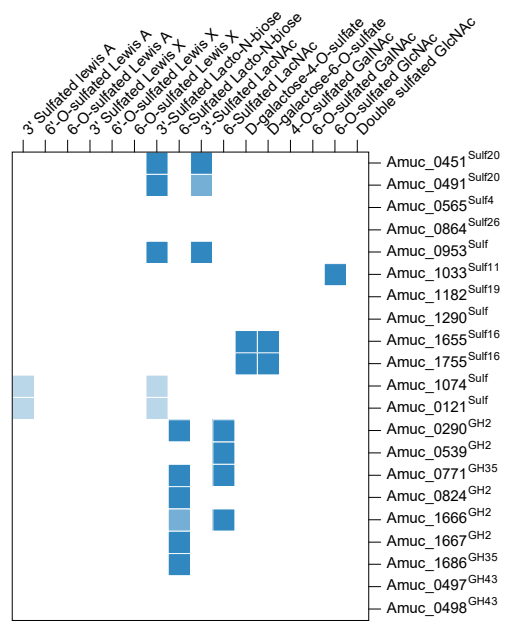
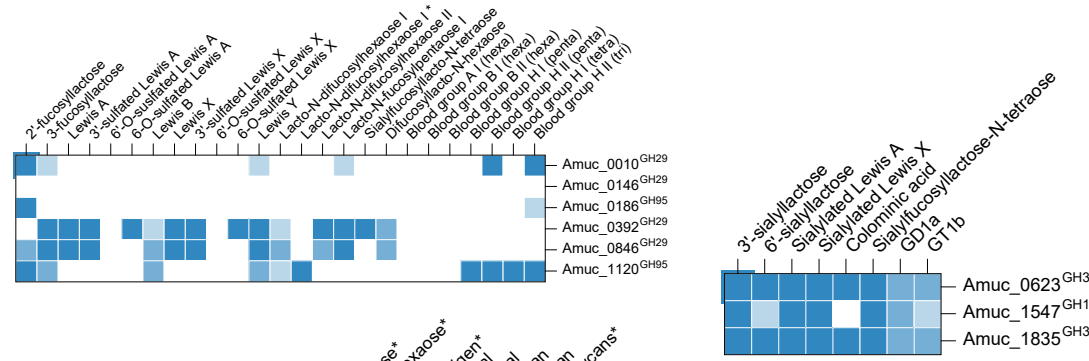
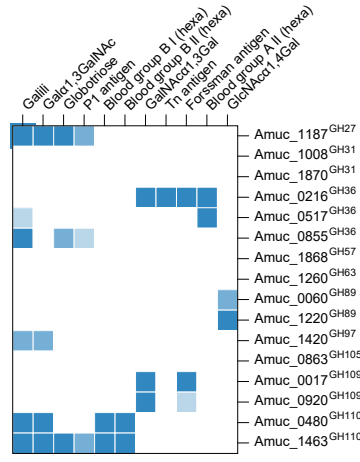
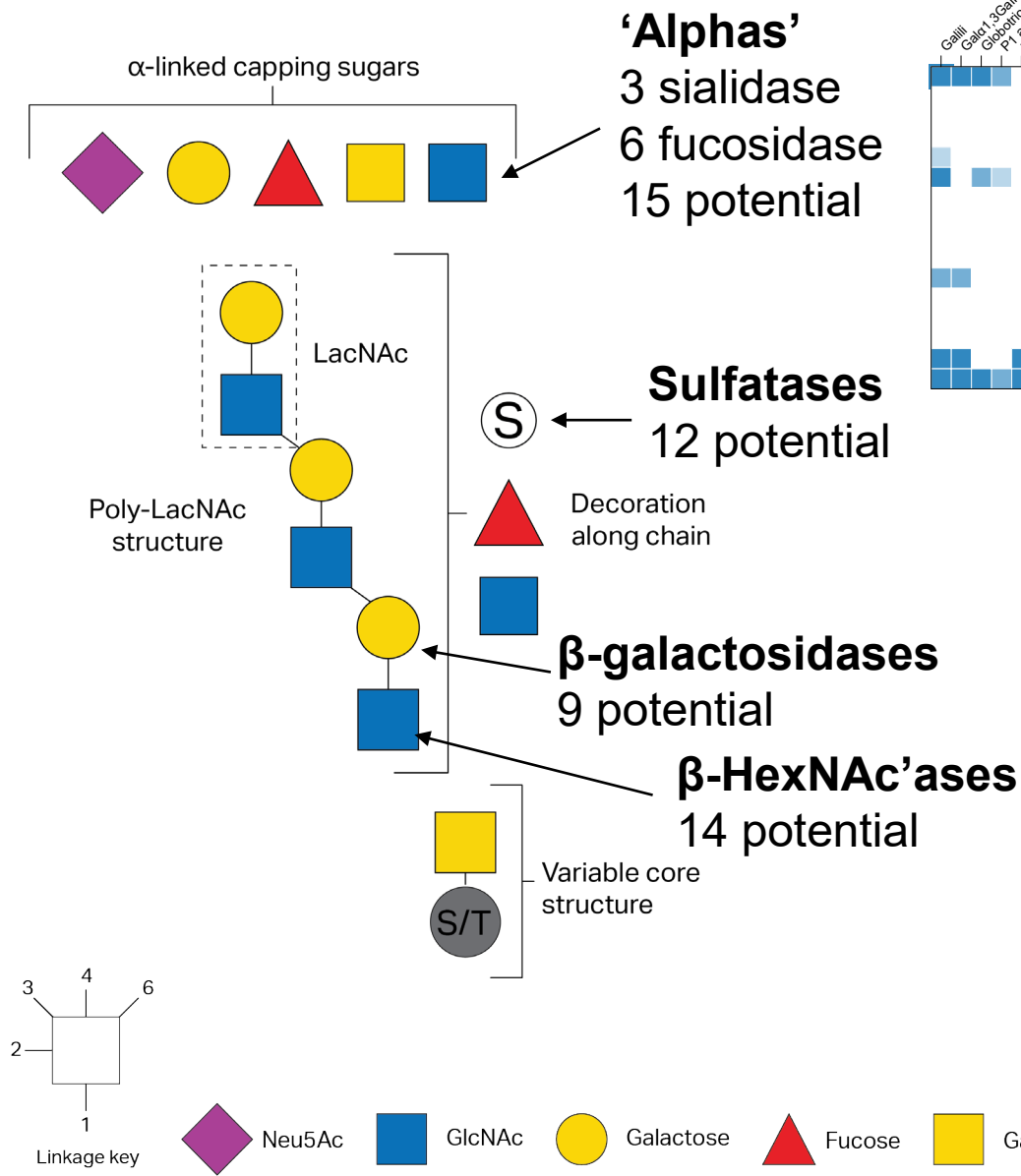


Complete deconstruction of mucin O-glycans

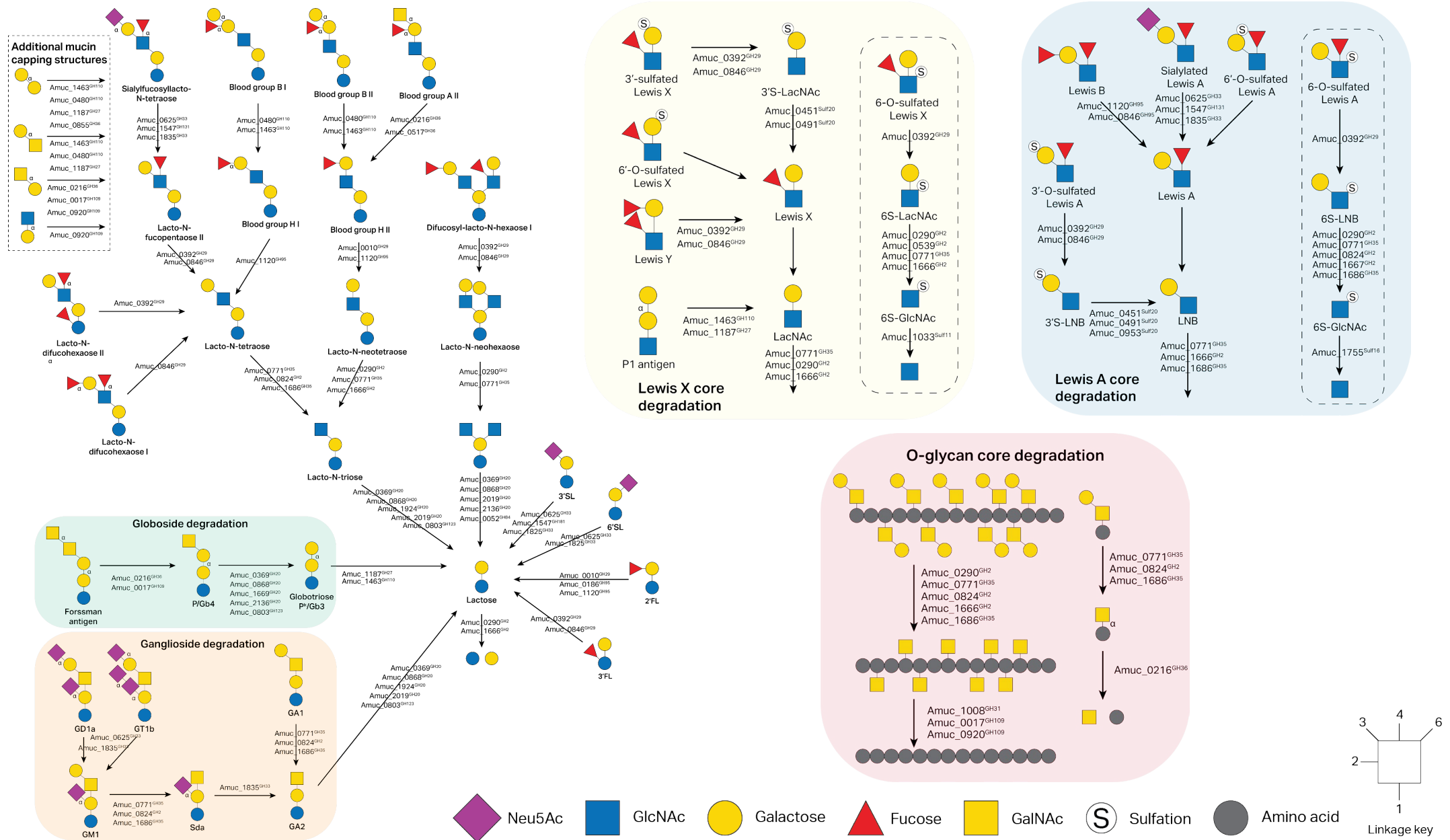
Amuc_1008^{GH31}



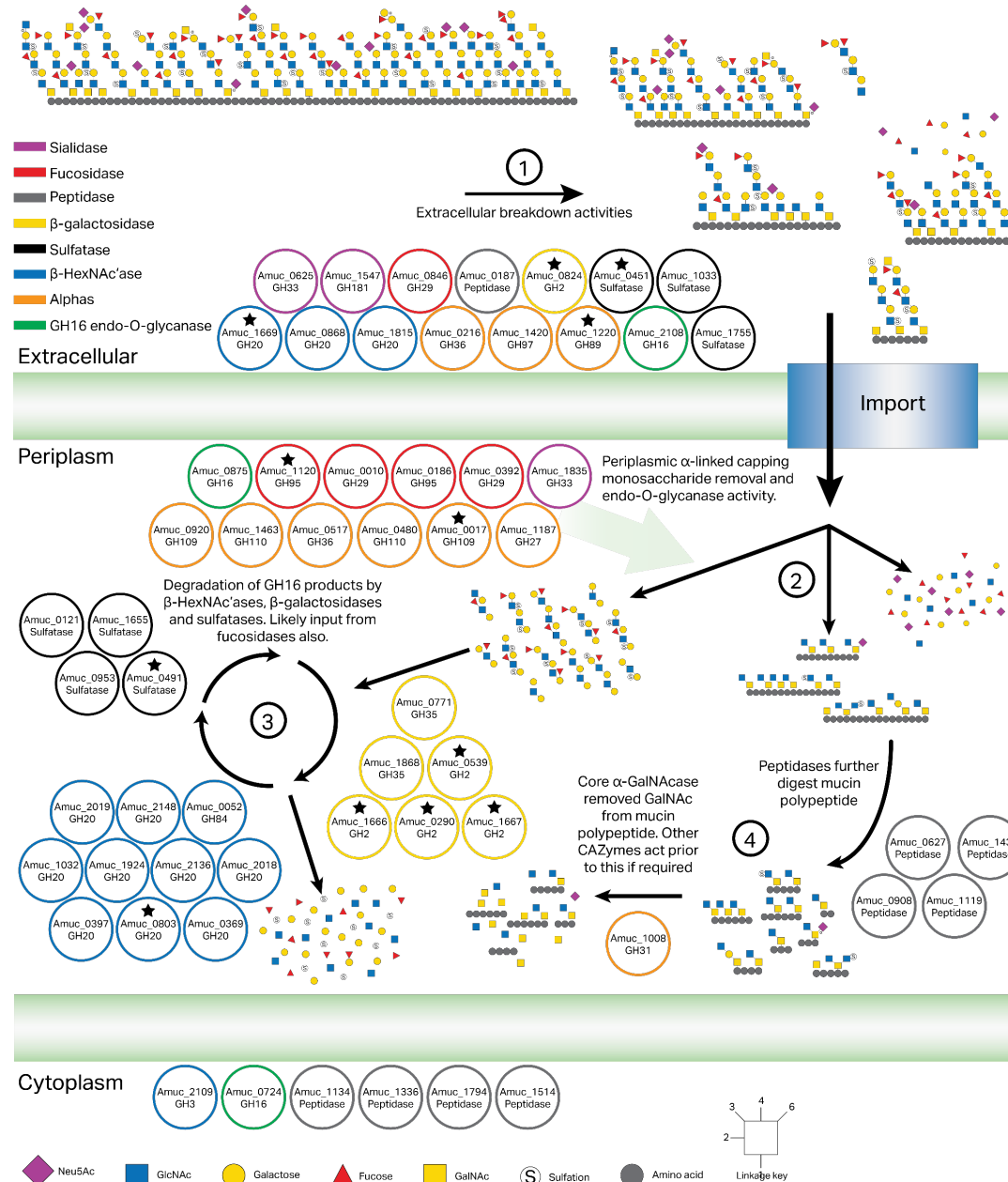
Akkermansia muciniphila CAZymes



Host glycan degradation by *A. muciniphila*



Complete deconstruction of mucin O-glycans



Preprint available at
BioRxiv



Acknowledgements



Technical University of Denmark

Bo Pilgaard



Jesper Holck



Newcastle University

Dave Bolam



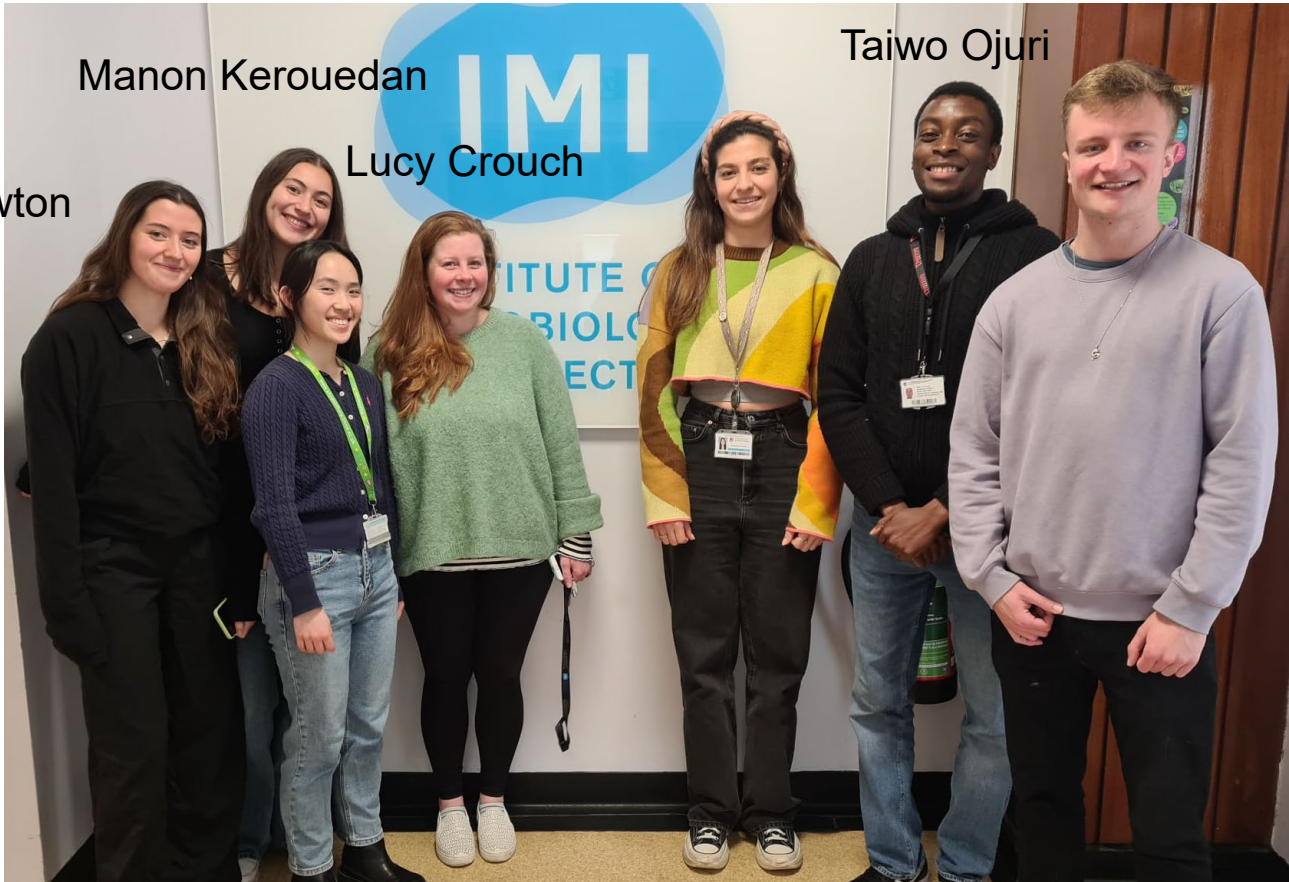
Maria Zakhour



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