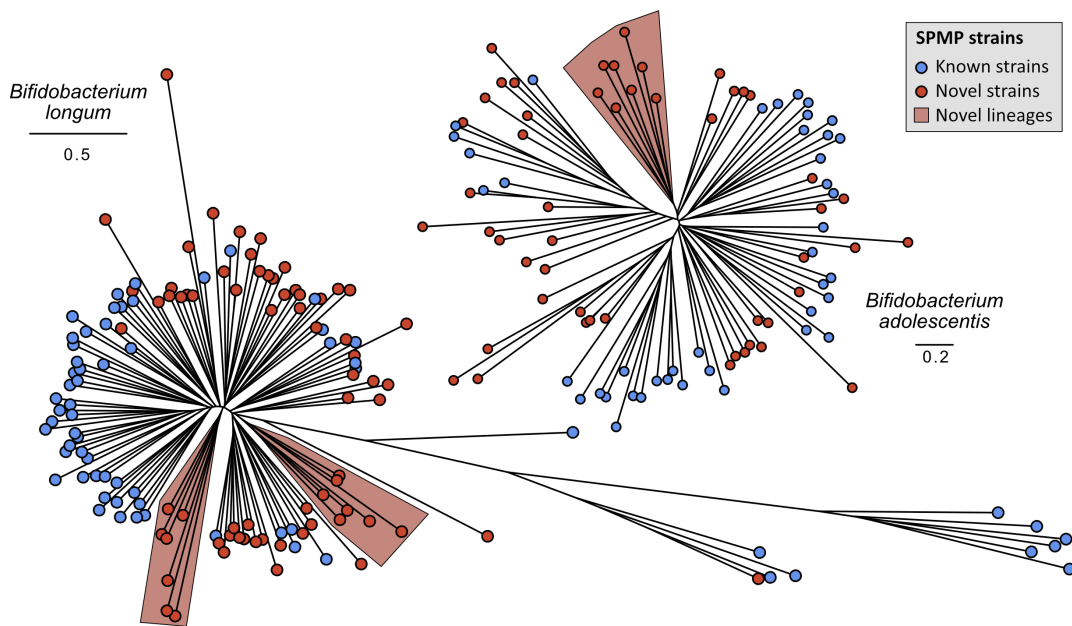


DIVERSE SINGAPOREAN GUT BACTERIA COULD HARBOUR NOVEL PROBIOTIC STRAINS



Phylogenetic tree showing relatedness between known and novel *Bifidobacterium* lineages. (credits: Genome Institute of Singapore)

05 December 2022 – A collaborative effort by Drs Niranjan Nagarajan, Jean-Sebastien Gounot and Minghao Chia from A*STAR’s Genome Institute of Singapore (GIS), along with Dr Henning Sedorf from Temasek Life Science Laboratories (TLL), and Prof Yik-Ying Teo from the National University of Singapore (NUS), comprehensively characterised 109 Singaporeans’ gut microbiomes. The research was published in [Nature Communications](#) on 13 October 2022.

The human gut harbours billions of genetically diverse micro-organisms, with hundreds of different species that help extract nutrients from undigested food, train the immune system, and ward off pathogens. The community of gut microbes essentially serves as an additional organ for the body. This community is unique to each individual and can vary widely between populations and ethnicities across the world. However, the full characterisation of all members within gut microbiomes remains technically challenging.



“Think of the Singaporean gut microbiome as an unexplored rainforest. Just as there are a vast number of unknown plants and animals which can produce medicinal compounds, so too are there as many novel gut microbial strains that could greatly benefit human health. We are explorers charting the rich diversity of gut microbes in Southeast Asia, providing a roadmap for similar efforts in other understudied populations around the world.”

*Dr Jean-Sebastien Gounot, post-doctoral fellow,
Laboratory of Metagenomic Technologies and Microbial Systems;
Co-first author of the study*

Leveraging Singapore’s ethnic diversity, and a hybrid-assembly approach previously developed in his laboratory, Prof Niranjan's team was able to produce a catalogue of high-quality reference genomes from microbes residing in the guts of healthy Singaporeans. This unique dataset uncovered 70 species and thousands of strains that have never been described before, highlighting a distinct biodiversity within Singaporean guts compared to what can be seen in Western populations.

In particular, his team discovered new strains and lineages belonging to the *Bifidobacterium* species, which are known to play important roles in human gut health and digestion. Analysis of the obtained genomes allowed the identification of thousands of novel gene clusters, which can be leveraged to help identify new probiotics and develop novel biotherapies.

“The knowledge gained from this study will be key in developing future population-specific therapies to improve human health and potential, with implications for further study on the role of the gut microbiome in various common conditions in Singapore such as diabetes, obesity, fatty liver disease, and colorectal cancer.”



*Dr Niranjan Nagarajan, Associate Director,
Laboratory of Metagenomic Technologies and Microbial Systems,
GIS, and corresponding author of the study*



“The gut microbiome is an important determinant of human health that has been linked to multiple diseases. The knowledge gained from this study will pave the way for developing future population-specific therapies to improve human health.”

Prof Patrick Tan, Executive Director, GIS