
Microbiome Metabolites:

Understanding Microbial Function Within the Host



AnalytiCon
discovery
The Natural Product Company

Global Engage 

**6TH MICROBIOME R&D &
BUSINESS COLLABORATION FORUM**
3RD PROBIOTICS CONGRESS: USA

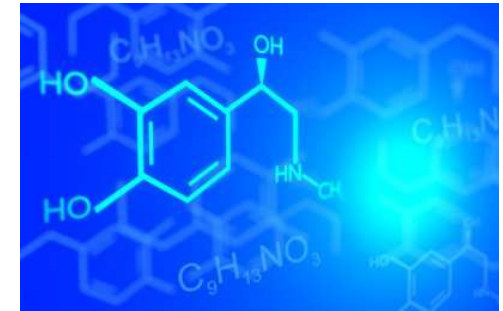
Microbiome Metabolites: Moving from Correlation to Causality to Innovation



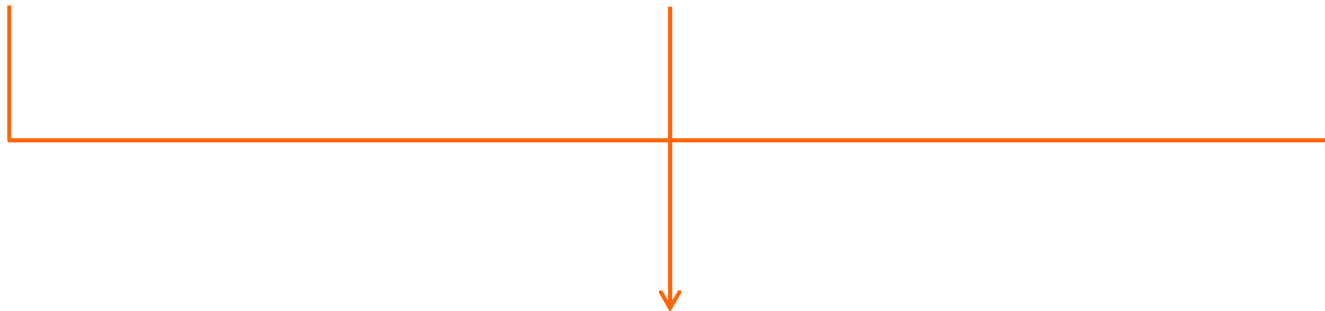
Who is There?



What are they Doing?



How are they Doing it?



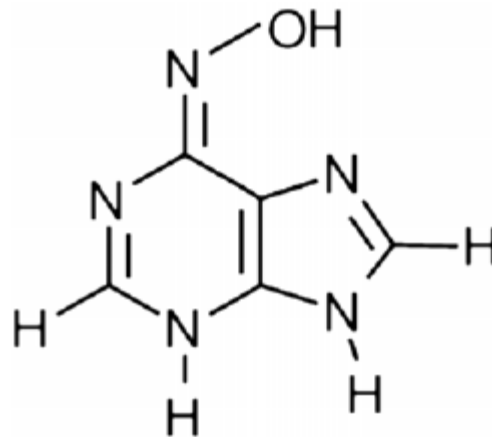
Microbiome Metabolites in the Literature

SCIENCE ADVANCES | RESEARCH ARTICLE

HEALTH AND MEDICINE

A commensal strain of *Staphylococcus epidermidis* protects against skin neoplasia

Teruaki Nakatsuji,¹ Tiffany H. Chen,¹ Anna M. Butcher,¹ Lynn L. Trzoss,² Sang-Jip Nam,^{2*} Karina T. Shirakawa,¹ Wei Zhou,³ Julia Oh,³ Michael Otto,⁴ William Fenical,² Richard L. Gallo^{1†}

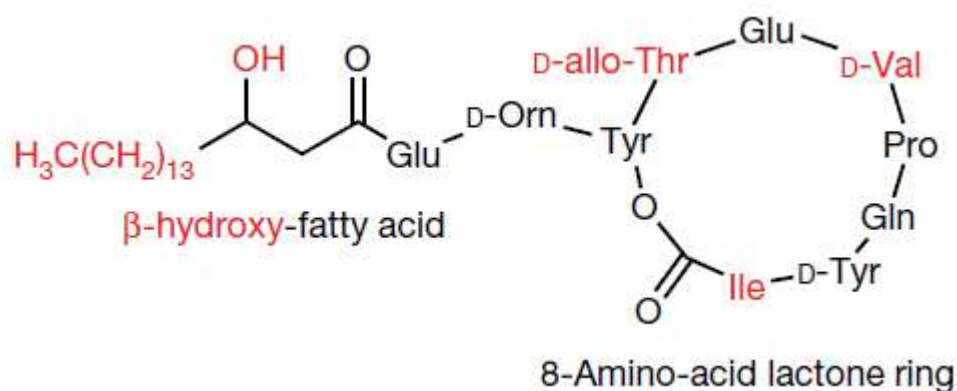


ARTICLE

<https://doi.org/10.1038/s41586-018-0616-y>

Pathogen elimination by probiotic *Bacillus* via signalling interference

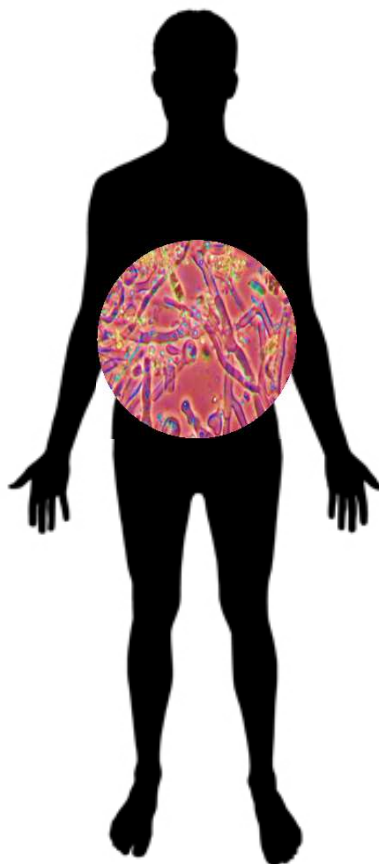
Pipat Piewngam^{1,2}, Yue Zheng^{1,5}, Thuan H. Nguyen^{1,5}, Seth W. Dickey¹, Hwang-Soo Joo^{1,4}, Amer E. Villaruz¹, Kyle A. Glose¹, Emilie L. Fisher¹, Rachelle L. Hunt¹, Barry Li¹, Janice Chiou¹, Sujiraphong Pharkjaksu², Sunisa Khongthong³, Gordon Y. C. Cheung¹, Pattarachai Kiratisin² & Michael Otto^{1,*}



Microbiome Metabolites by the Numbers

3,000

The approximated number of biosynthetic gene clusters in the human microbiota identified from the HMP data set predicted to code for small molecules, most of unknown structure and function²



2%

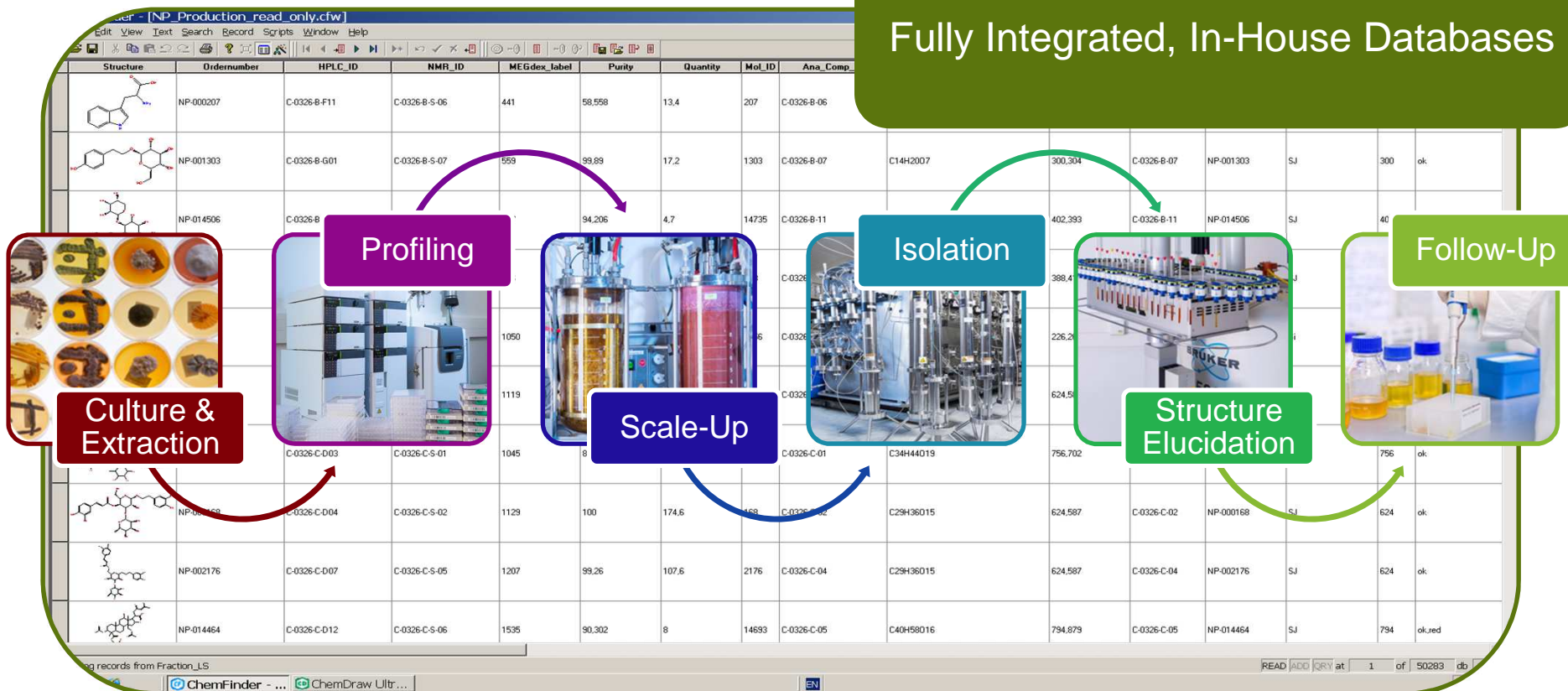
The estimated percentage of the microbiome metabolomics data from mass spectrometry that can currently be annotated¹

¹ Brown and Hazen. Targeting of Microbe-Derived Metabolites to Improve Human Health: The Next Frontier for Drug Discovery. *J. Biol. Chem.* (2017)

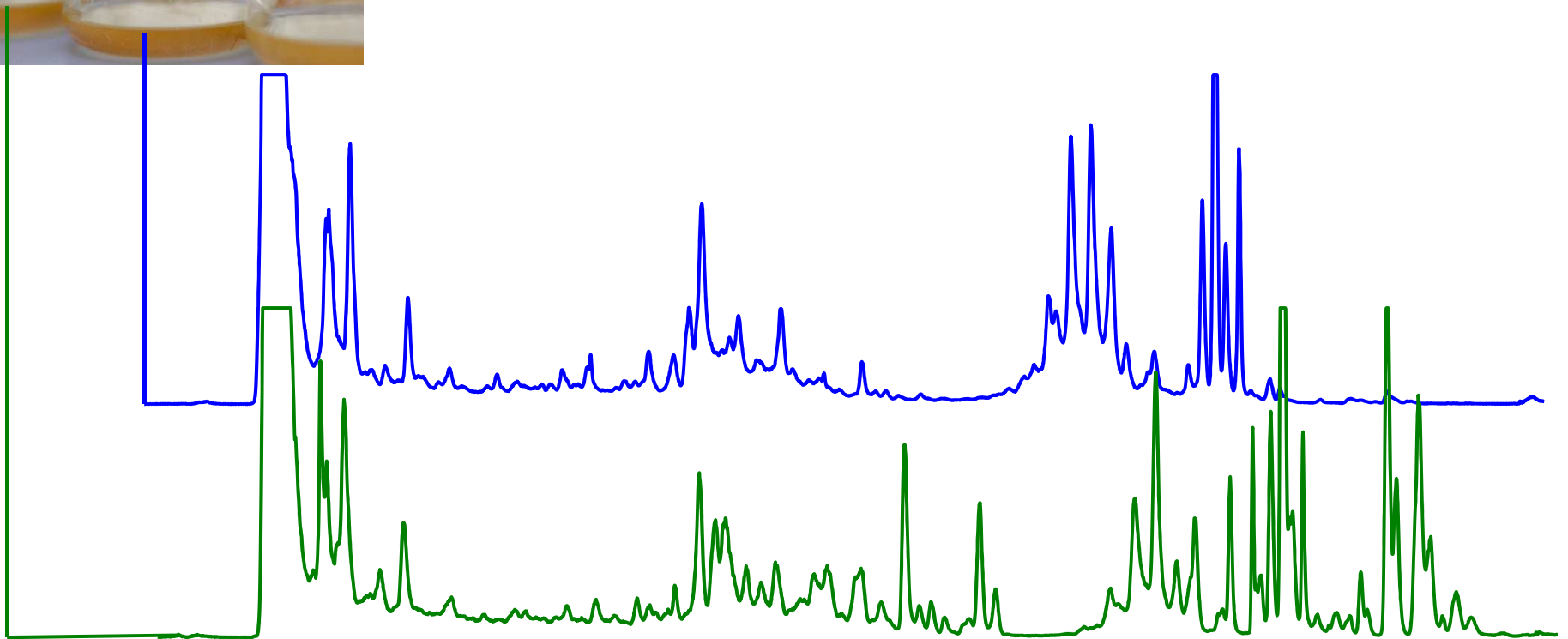
² Donia, M. S. *et al.* A Systematic Analysis of Biosynthetic Gene Clusters in the Human Microbiome Reveals a Common Family of Antibiotics. *Cell* . (2014).

A Natural Product Approach to Microbiome Metabolites

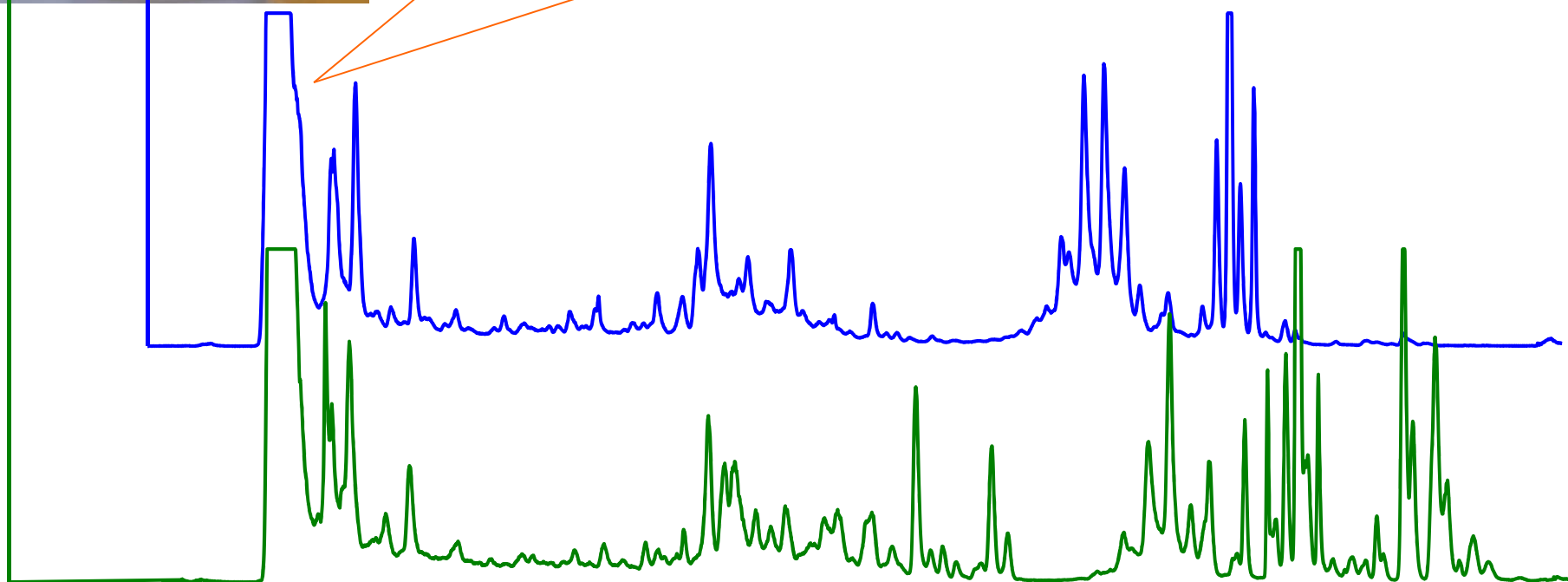
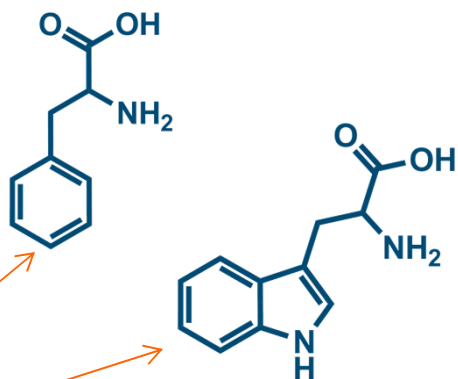
Fully Integrated, In-House Databases



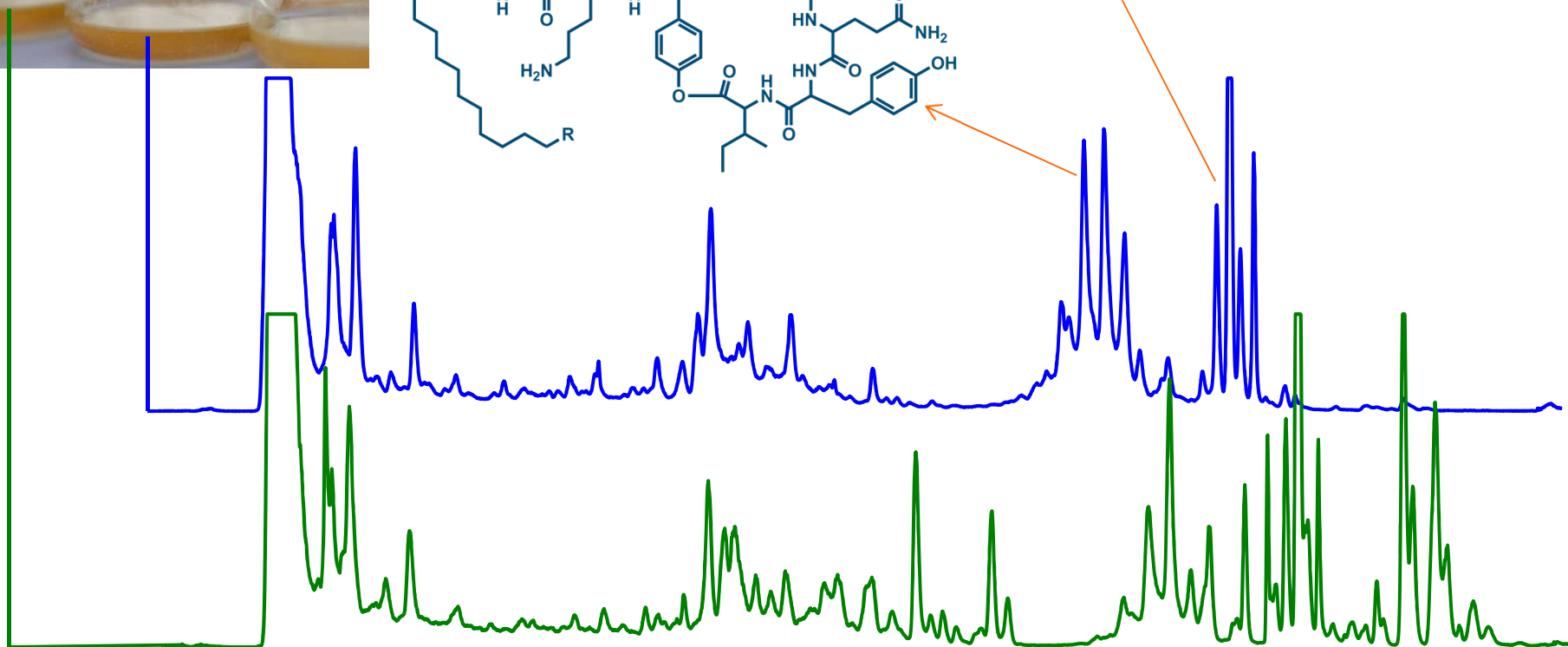
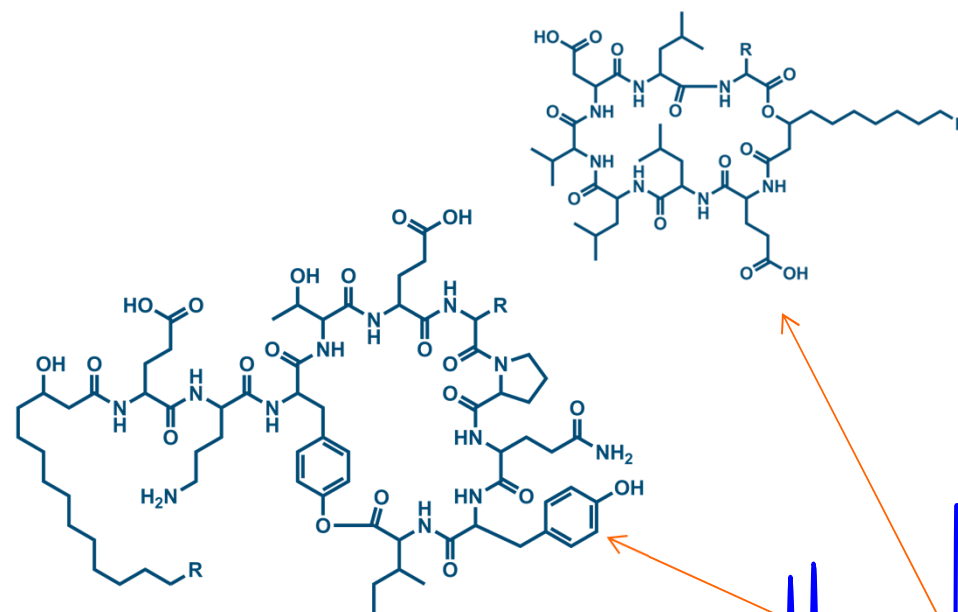
Case Study: *B. subtilis*; Culture, Extraction, & Profiling



Case Study: *B. subtilis*; structure elucidation

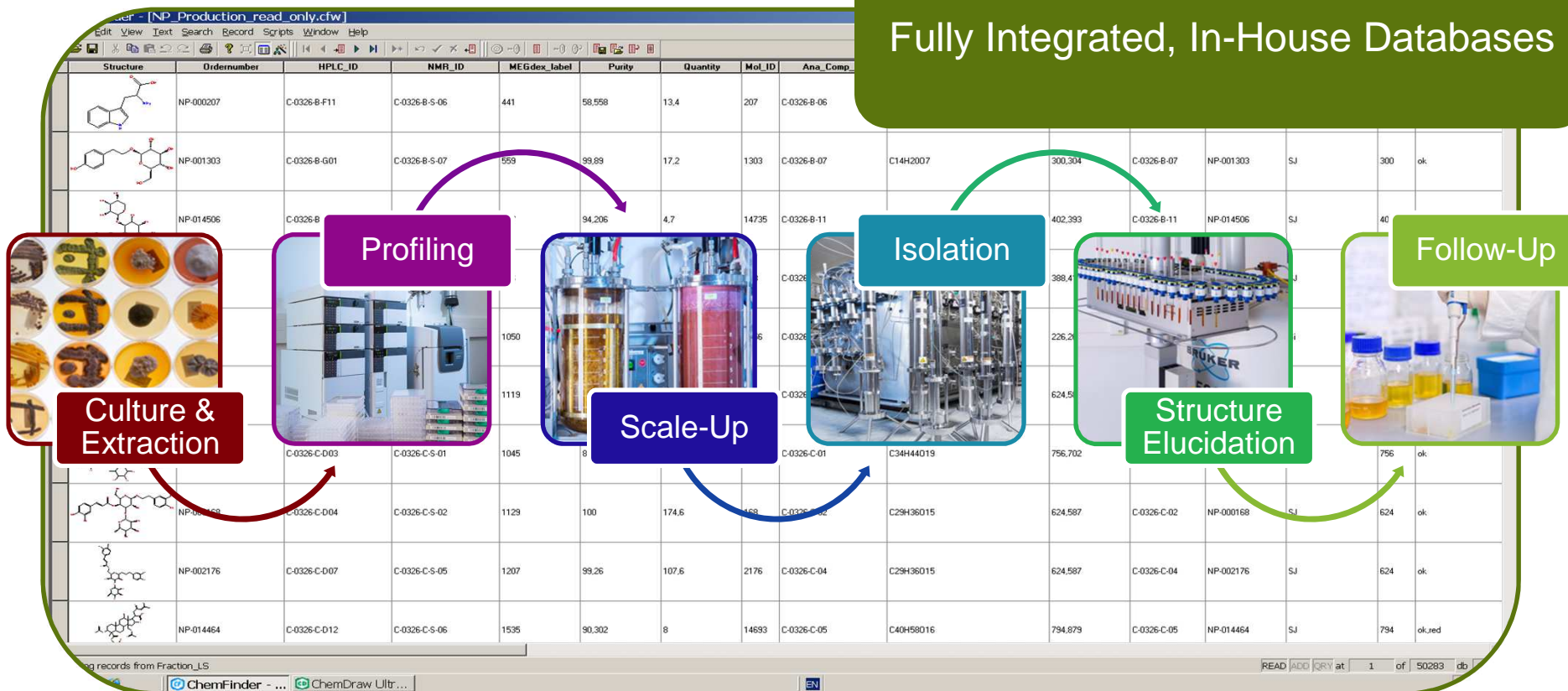


Case Study: *B. subtilis*; structure elucidation

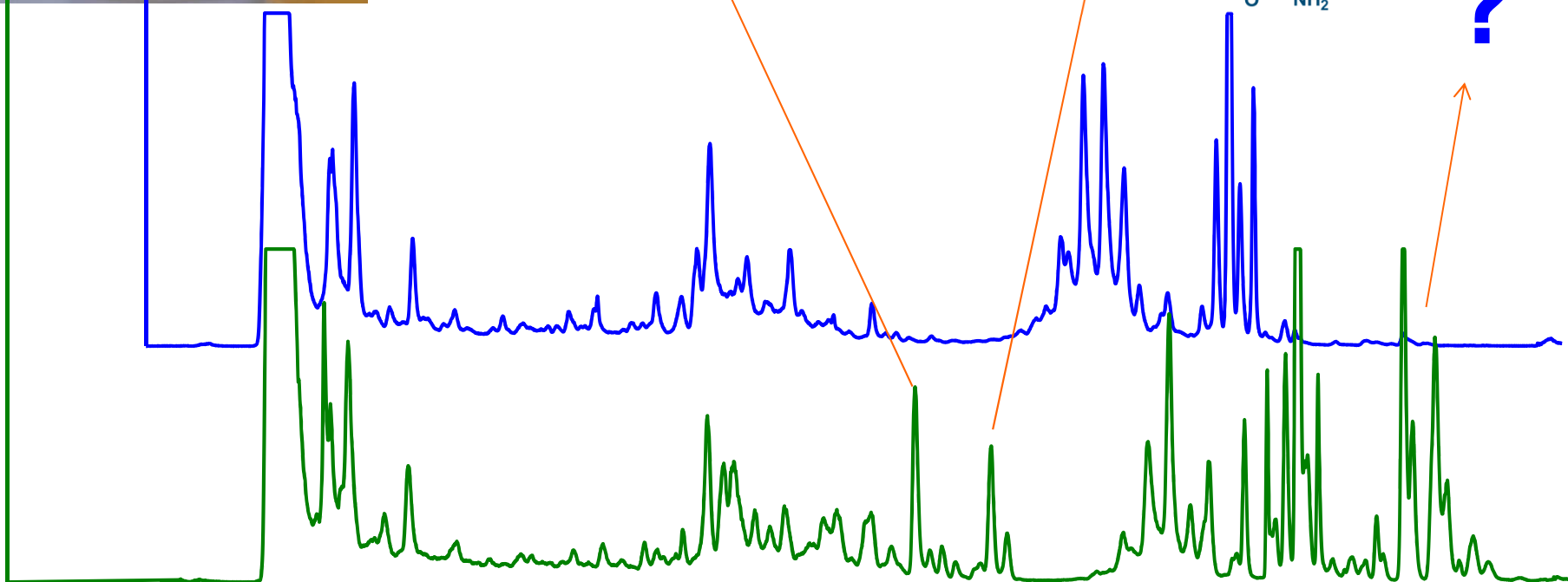
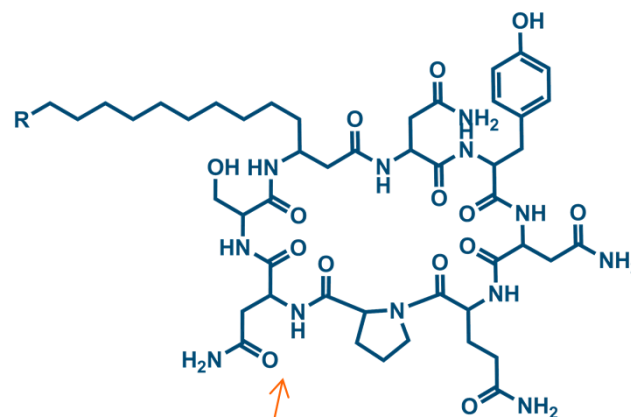


A Natural Product Approach to Microbiome Metabolites

Fully Integrated, In-House Databases



Case Study: *B. subtilis*; structure elucidation



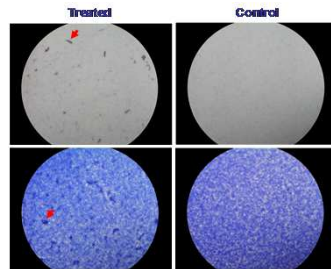
Case Study: *B. subtilis*; Follow-Up

Multilable Assaying



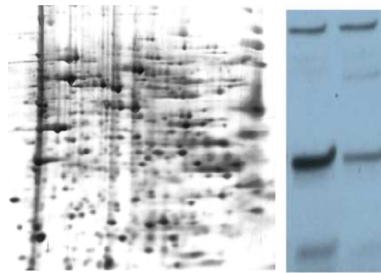
- Victor V (PE)
- Flexstation 3 (MD)

Microbiology



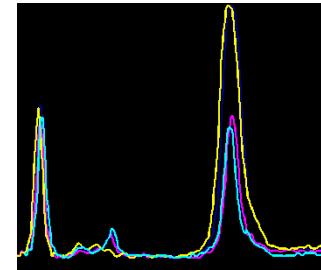
- *BSL 1 & 2*
(*GMO/ WT*)

PAGE / WB



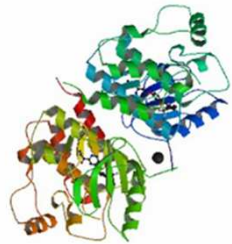
- *Large-format*
- *E-Gel*

Chromatography

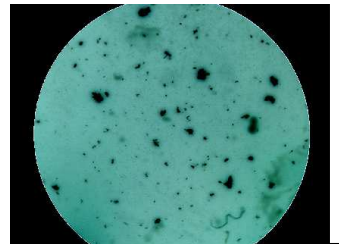


- *FPLC*
- *HPLC*

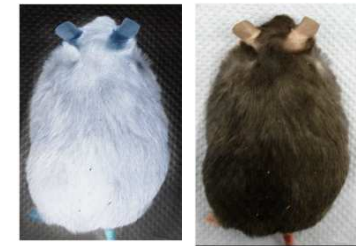
Target-based



Cell-based / functional (phenotypic)



In-Vivo-based



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Metabolite Solutions for Microbiome Drug Discovery



- Aerobic & Anaerobic Fermentation
- Small- to Large-Scale Fermentation
- Culture & Extraction Optimization
- Extract Profiling & Dereplication
- Preparative Chromatography
- Metabolite Purification & Identification
- Chemical & Biological Assays
- Synthetic & Medicinal Chemistry



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