The discovery and development of antibiotics has saved countless lives. However, the growing threat of antimicrobial resistance (AMR), along with the detrimental effects of nonspecific antibiotics, demonstrate the need for more targeted antibiotic treatments.[1] *Heliobacter pylori* is one such antibiotic-resistant pathogen which is linked to stomach ulcers and gastric cancer. Though not pathogenic in all cases, *H. pylori* colonizes nearly half the global population,[2] and current treatments use a combination of drugs that are often harmful to the host.[3] This urgent need for new treatment has earned it bal priority pathogens[4] and is the primary motivation behind my research in the Dube Lab.

Bacterial glycans sugar-containing molecules found on bacteria have previously been identified as potential antibiotic targets because of their species-dependent specificity.[5] Furthermore, these polysaccharide structures are frequently critical to cell fitness; they are implicated in functions such as host adhesion and immune cell recognition or, in some cases, evasion.[6] These observations are especially true for pathogenic species; previous studies have shown that pathogens which cannot effectively synthesize glycans have reduced pathogenesis.[7] Bacterial glycans are clearly intriguing therapeutic targets, but their complexity makes them difficult to study. Mammalian glycans, upon which many analytical techniques are based, use 9 monosaccharide substrates. Bacterial glycans use over 700. This sheer number of monosaccharides makes bacterial glycans difficult to study by conventional methods.[6] Previous work in the Dube lab has utilized Metabolic Oligosaccharide Engineering (MOE) to ease this process: a fluorescent or otherwise visualizable monosaccharide is introduced into the cell, incorporated into its glycan structures, and visualized with a biorthogonal reaction (independent of host machinery) to confirm the presence or absence of glycans.[8] This can be employed following genetic mutation to measure the impact of different gene knockdowns upon glycan synthesis. In this way, at least 13 genes involved in glycoprotein synthesis in *H. pylori* have been identified by the Dube lab. The

(1) Allison, T. M.; Conrad, S.; Castric, P. The Group I Pilin Glycan Affects Type IVa Pilus Hydrophobicity and Twitching Motility in Pseudomonas Aeruginosa 1244. *Microbiology* , *161* (9), 1780–1789. https://doi.org/10.1099/mic.0.000128.
(2) Centers for Disease Control and Prevention (U.S.). *Antibiotic Resistance Threats in the United States, 2019*; Centers for Disease Control and Prevention (U.S.), 2019. https://doi.org/10.15620/cdc:82532.
(3) Malfertheiner, P.; Megraud, F.; O'Morain, C.; Bazzoli, F.; El-Omar, E.; Graham, D.; Hunt, R.; Rokkas, T.; Vakil, N.; Kuipers, E. J.; The European Helicobacter Study Group (EHSG). Current Concepts in the Management of Helicobacter Pylori Infection: The Maastricht III Consensus Report. *Gut* , *56* (6), 772–781. https://doi.org/10.1136/gut.2006.101634.
(4) Kudelka, M. R.; Antonopoulos, A.; Wang, Y.; Duong, D. M.; Song, X.; Seyfried, N. T.; Dell, A.; Haslam, S. M.; Cummings, R. D.; Ju, T. Cellular O-Glycome Reporter/Amplification to Explore O-Glycans of Living Cells. *Nat. Methods* , *13* (1), 81–86. https://doi.org/10.1038/nmeth.3675.
(5) Suzuki, H.; Iwasaki, E.; Hibi, T. Helicobacter Pylori and Gastric Cancer. *Gastric Cancer* , *12* (2), 79–87. https://doi.org/10.1007/s10120-009-0507-x.
(6) Luong, P.; Dube, D. H. Dismantling the Bacterial Glycocalyx: Chemical Tools to Probe, Perturb, and Image Bacterial Glycans. *Bioorg. Med. Chem.* , *29*, 115868. https://doi.org/10.1016/j.bmc.2020.115868.
(7) Thung, I.; Aramin, H.; Vavinskaya, V.; Gupta, S.; Park, J. Y.; Crowe, S. E.; Valasek, M. A. Review Article: The Global Emergence of *Helicobacter Pylori* Antibiotic Resistance. *Aliment. Pharmacol. Ther.* , *43* (4), 514–533. https://doi.org/10.1111/apt.13497.
(8) Tra, V. N.; Dube, D. H. Glycans in Pathogenic Bacteria –