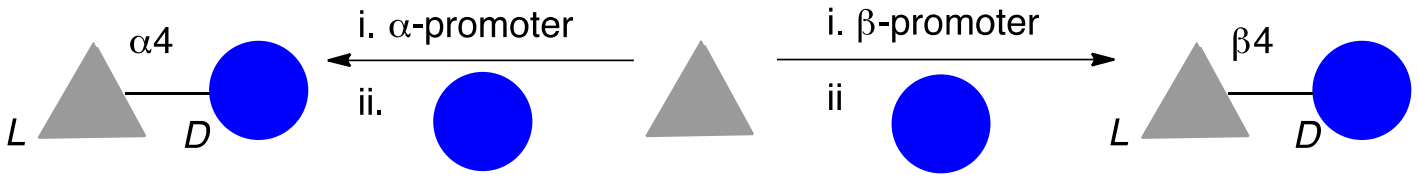
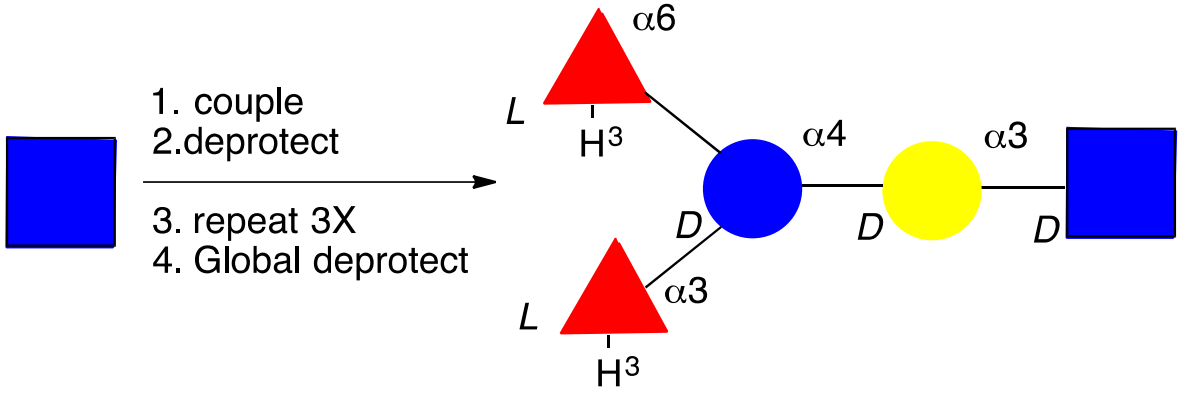
Common Fund Research in the Bennett Group: Reagent Controlled Glycosylation (U01GM120414-01)

Developing Chemical Promoters that Permit Absolute Control Over the Stereochemical Outcome of Glycosylation Reactions:



These Promoters will Make Oligosaccharide Construction Similar to Peptide Synthesis:

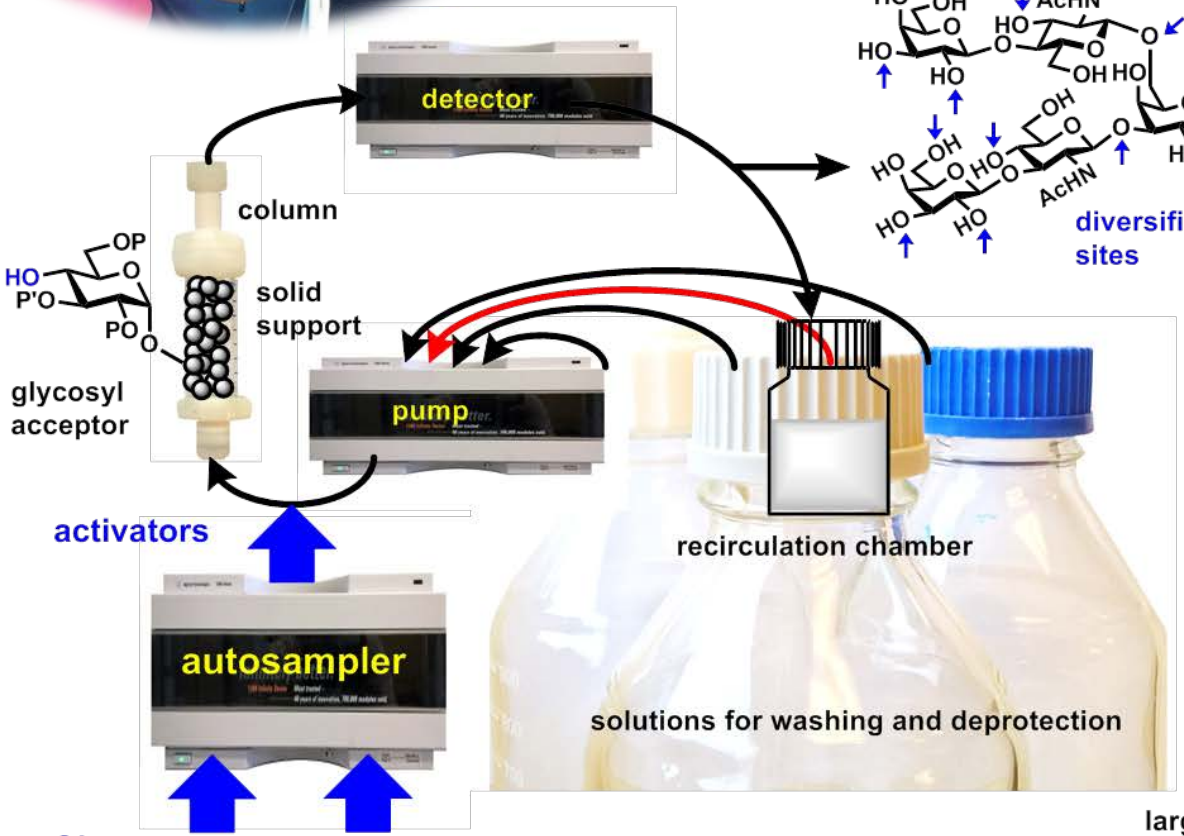


Rapid Construction of Oligosaccharides for Analytical Standards and Therapeutic Development!

https://commonfund.nih.gov/Glycoscience/fundedresearch#

Refinement and implementation of the automated oligosaccharide synthesizer (U01GM120673, 2016-)

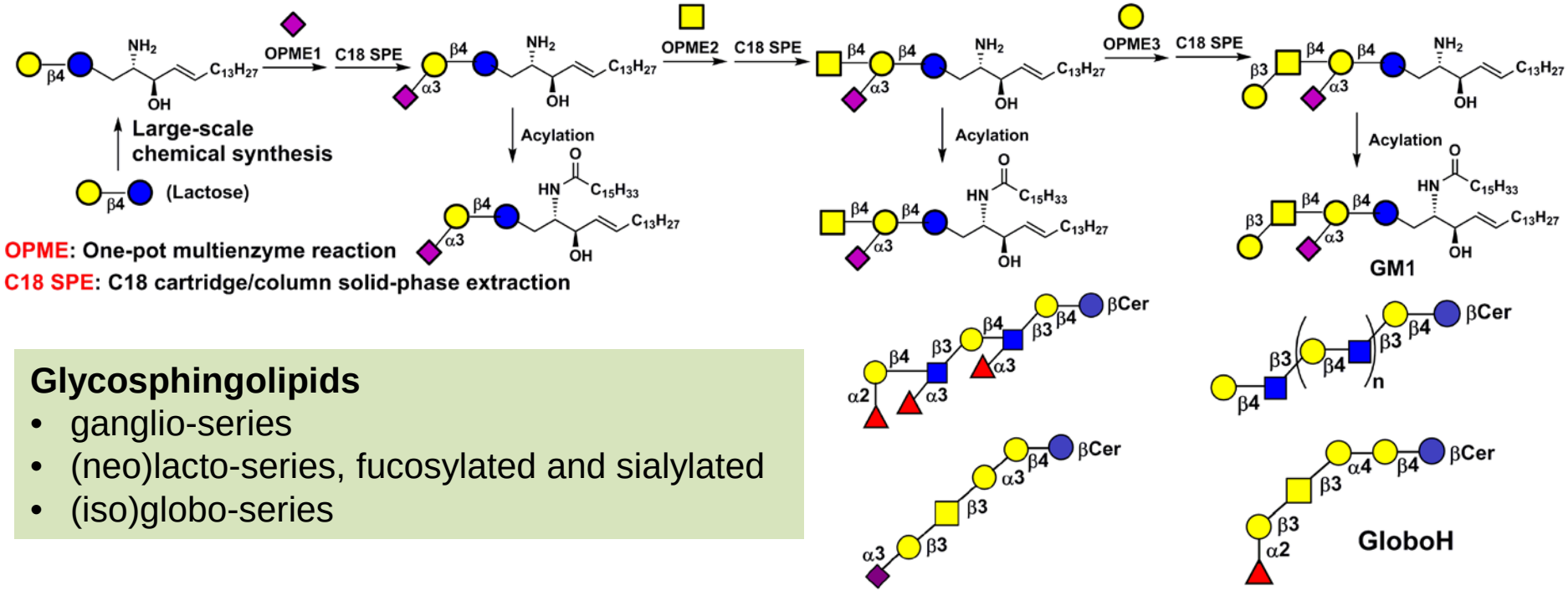
Alexei V. Demchenko, Keith J. Stine, University of Missouri - St. Louis
& Cristina De Meo, Southern Illinois University, Edwardsville



Facile chemoenzymatic synthesis and purification of glycolipids

NIH Common Fund Glyco-science Program (U01GM120419)

Xi Chen, U. of California-Davis, xiichen@ucdavis.edu, http://chenglyco.faculty.ucdavis.edu/
Peng G. Wang, Georgia State U., pwang11@gsu.edu, http://lithium.gsu.edu/faculty/PWang/

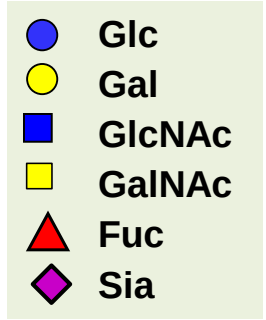


Glycosphingolipids

- ganglio-series
- (neo)lacto-series, fucosylated and sialylated
- (iso)globo-series

Goal: To allow non-specialists to synthesize, functionalize, purify, and study glycosphingolipids

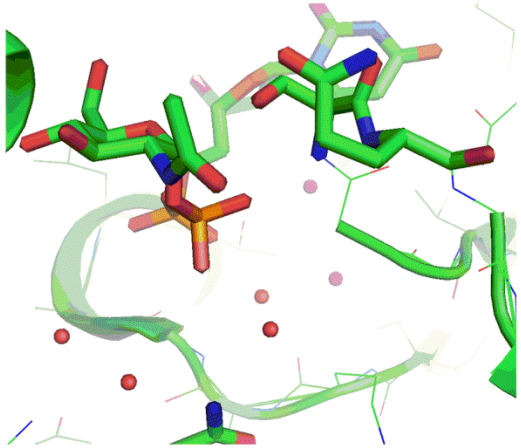
- Identify stable storage conditions for enzymes and reagents
- Assemble OPME enzyme and reagent kits
- Optimize reaction and purification conditions
- Establish protocols for OPME synthesis and C18 cartridge/column purification
- Cross-validation
- For more information, see http://chenglyco.faculty.ucdavis.edu/glycosphingolipids/

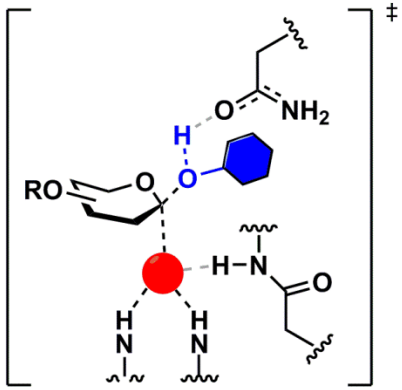


Jacobsen Group

Developing Catalysts for Selective Glycosylation

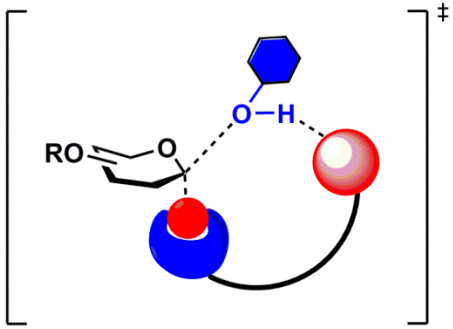
Nature's solution:





Transferase-inspired synthetic catalysts

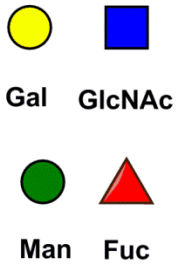
Our approach:



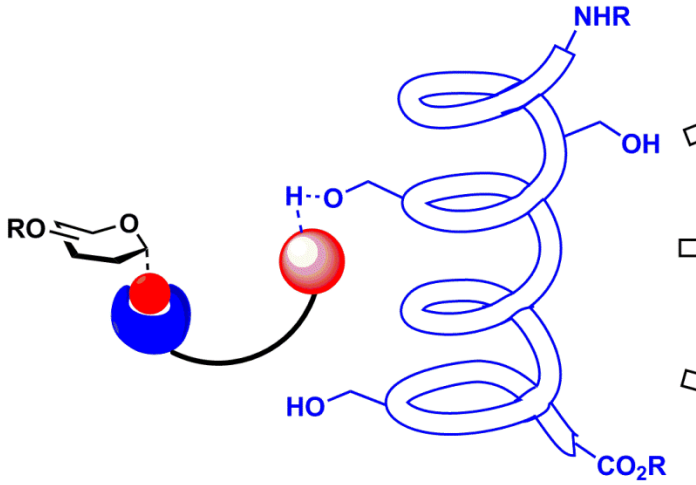
- Mild reaction condictions through dual-activation strategy
- Catalyst-controlled selectivity

New strategy enables:

- Broad glycosyl donor scope



... and others



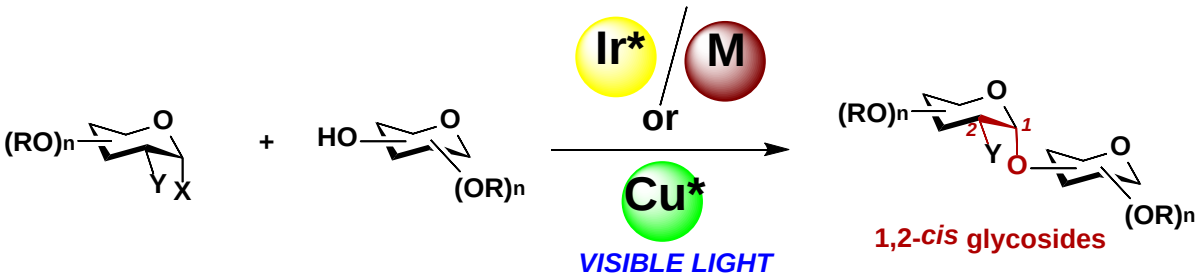
- Catalyst control of multiple reactive sites
- Broad functional group compatability
  - -Amino acids
  - -Glycosyl acceptors
- Conjugates selectively to:
  - -Amines
  - -Thiols
  - -Alcohols

Park, Y; Harper, K. C.; Kuhl, N.; Kwan, E. E.; Liu, R. Y.; Jacobsen, E. N. *Science* **2017**, *355,* 162.

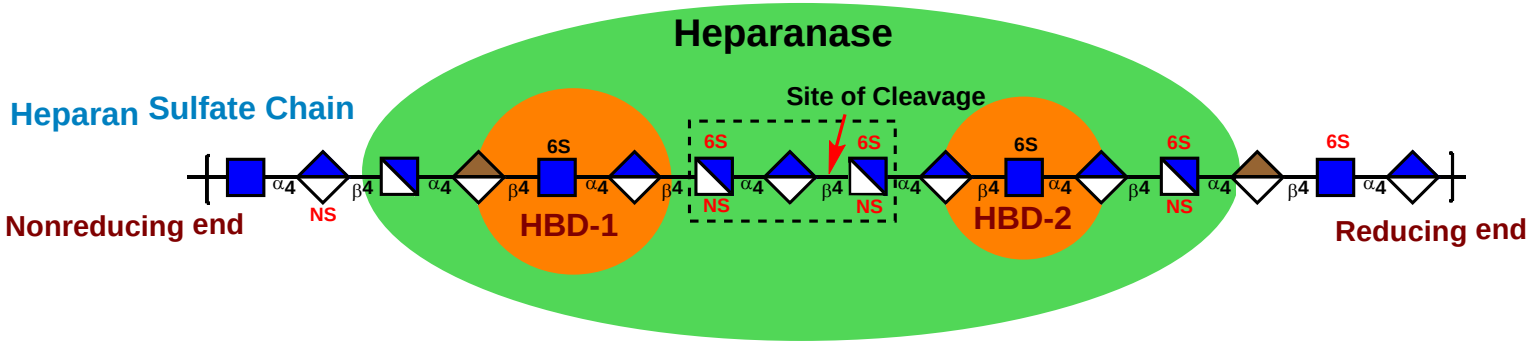
Kwan, E. E.; Park, Y.; Besser, H. A.; Anderson, T. L.; Jacobsen, E. N. *J. Am Chem. Soc.* **2017**, *139*, 43

NIH Common Fund Research in the Nguyen Group: Stereoselective 1,2-Cis Glycosylation

Developing predictable and stereoselective 1,2-cis glycosylation reactions via either dual catalytic photoredox catalysis or photoinduced copper catalysis



Rapid and stereoselective synthesis of bioactive oligosaccharides for analytical standards and therapeutic applications

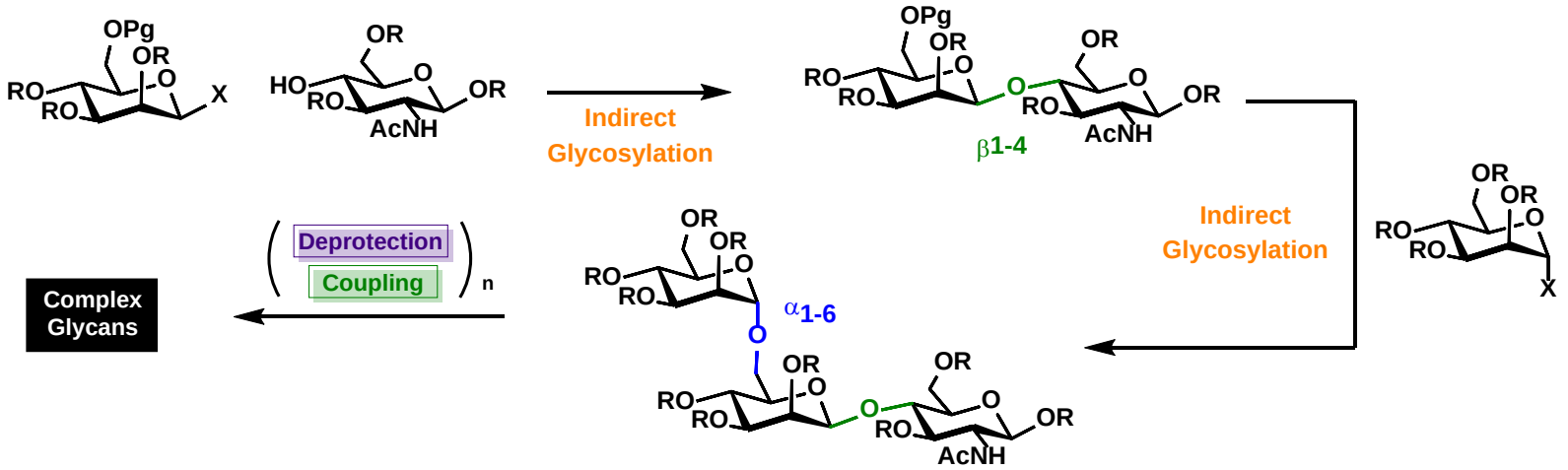


NIH-U01 GM120293
https://commonfund.nih.gov/Glycoscience

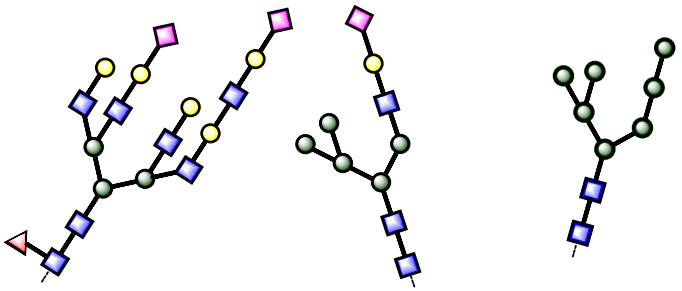
Hien M. Nguyen (hien-nguyen@uiowa.edu)
University of Iowa
https://nguyenresearchgroup.lab.uiowa.edu/

NIH Common Fund Research in the Brichacek Group: Novel Glycosylation Mechanisms

Indirect Glycosylation Methods to Facilitate More Efficient and Selective Couplings



Enable access of oligosaccharides of defined sequence, branching, and stereochemistry on demand to a diverse range of biomedical researchers.



NIH-U01GM120410

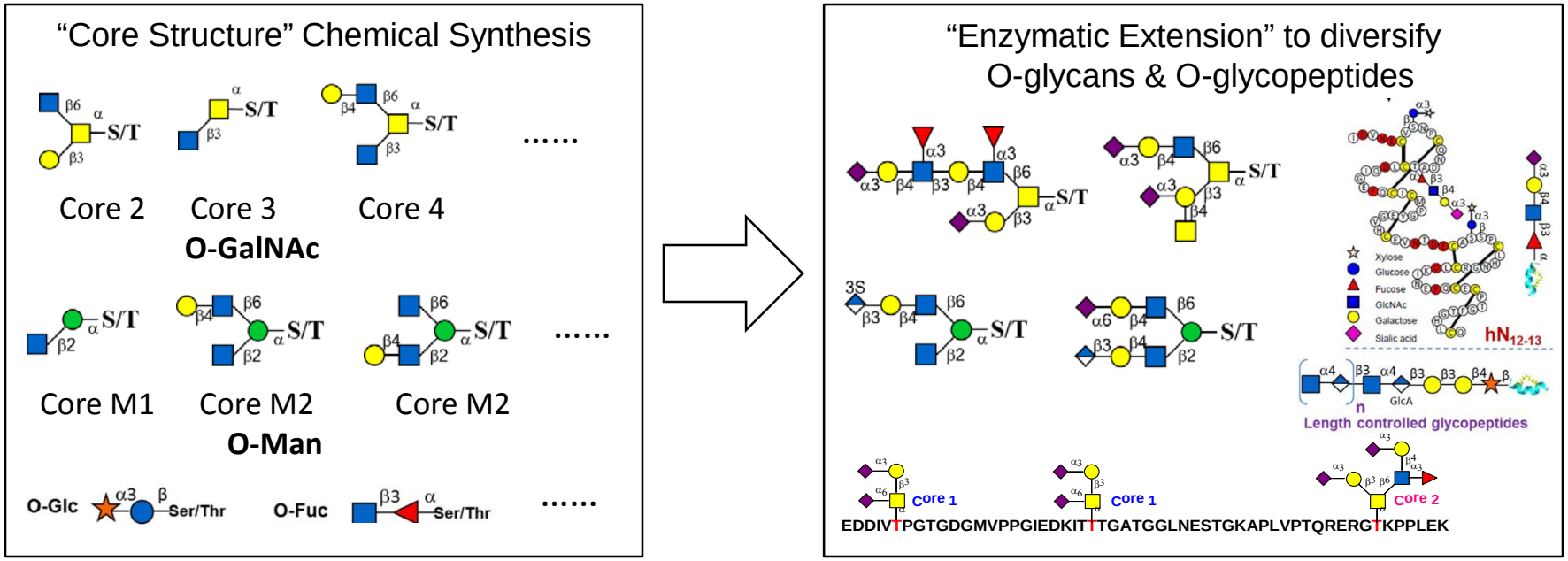
commonfund.nih.gov/Glycoscience

Matt Brichacek, University of Maine

umaine.edu/brichlab/

Facile Synthesis of O-glycans & O-glycopeptides

NIH Common Fund Glyco-science Program (U01GM116263)
Peng George Wang & Lei Li, Georgia State University

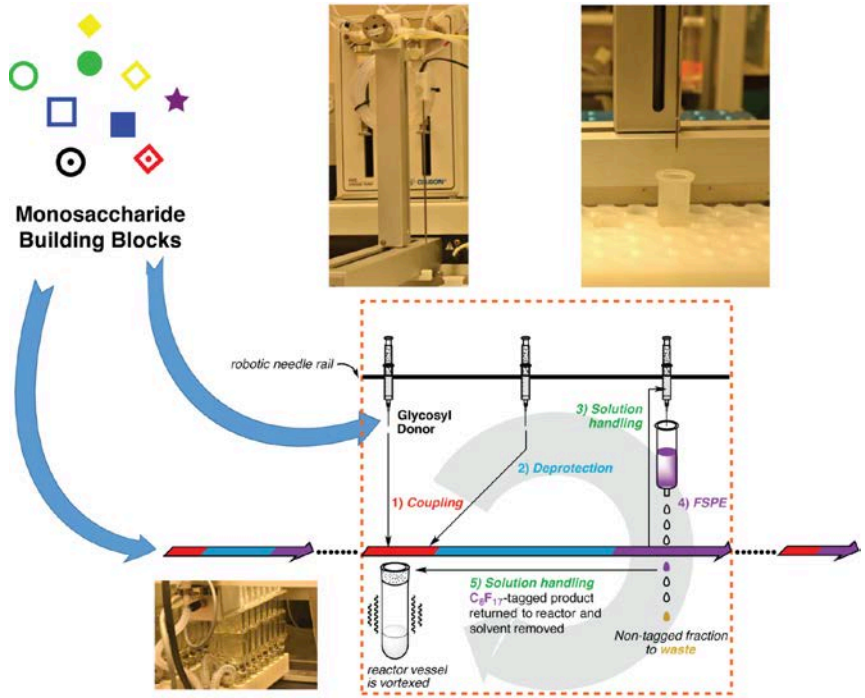


Goal: Develop "Core Synthesis/Enzymatic Extension" strategy for the access of O-glycan and O-glycopeptide librieres, automated glyopeptide synthesis

- Convergent chemical synthesis of O-glycan core structures in gram scale;
- Enzymatic extension strategy allows diversity of core structures;
- Automatic glycopeptide synthesis on solid phase/water soluable supports;
- Synthesis of hundreds of O-glycans and O-glycopeptides;
- Cross-validation

Common Fund Research in the Pohl/Dong Groups: Sugar Building Blocks and Automated Synthesis of Biomedically-Relevant Glycans

Developing Chemical Methods to Access Building Blocks and Create Oligosaccharides Using Solution-Phase Automation Platforms

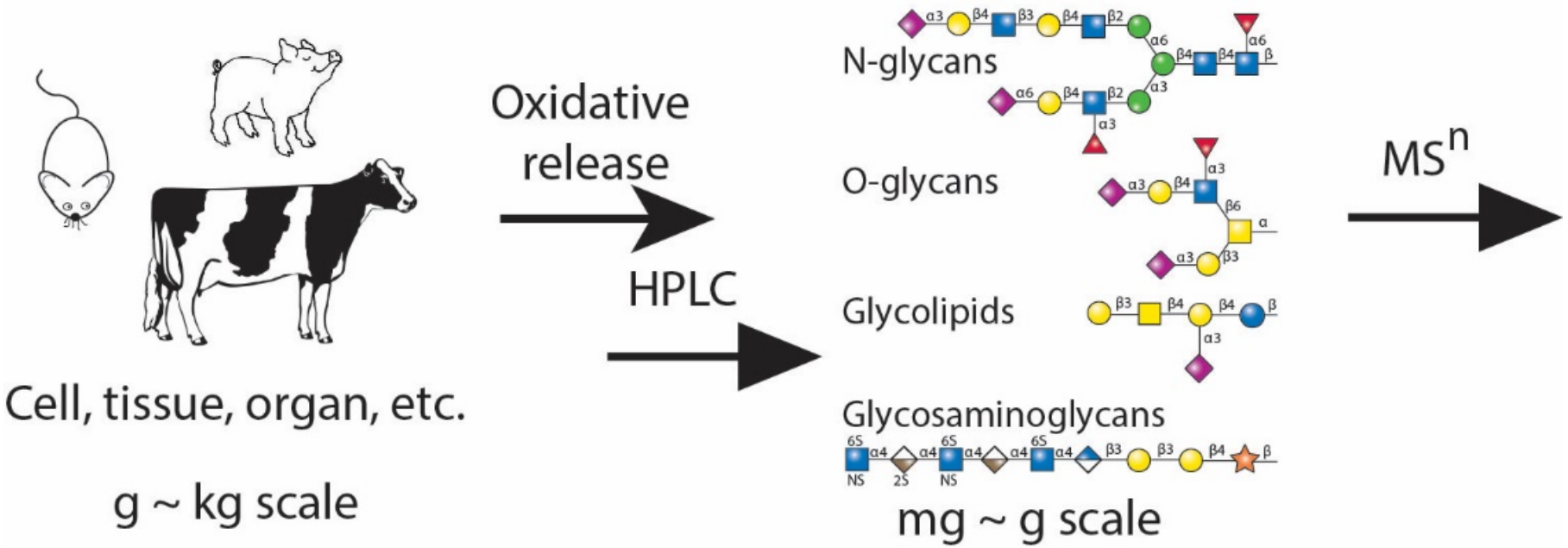


Human Milk Oligosaccharides, Bacterial Rhamnans, and Mammalian O- and N-Glycans

- ***Analytical standards and compounds for bioassays with the potential to incorporate fluorescent and other labels***
- ***New methods to purify synthetic glycans to 99.5%+ purity for immunological studies*** *(Chem Commun.* **2016**, *52*, 13253*)*

https://commonfund.nih.gov/Glycoscience/fundedresearch#

Large scale chemical preparation of glycans from natural sources

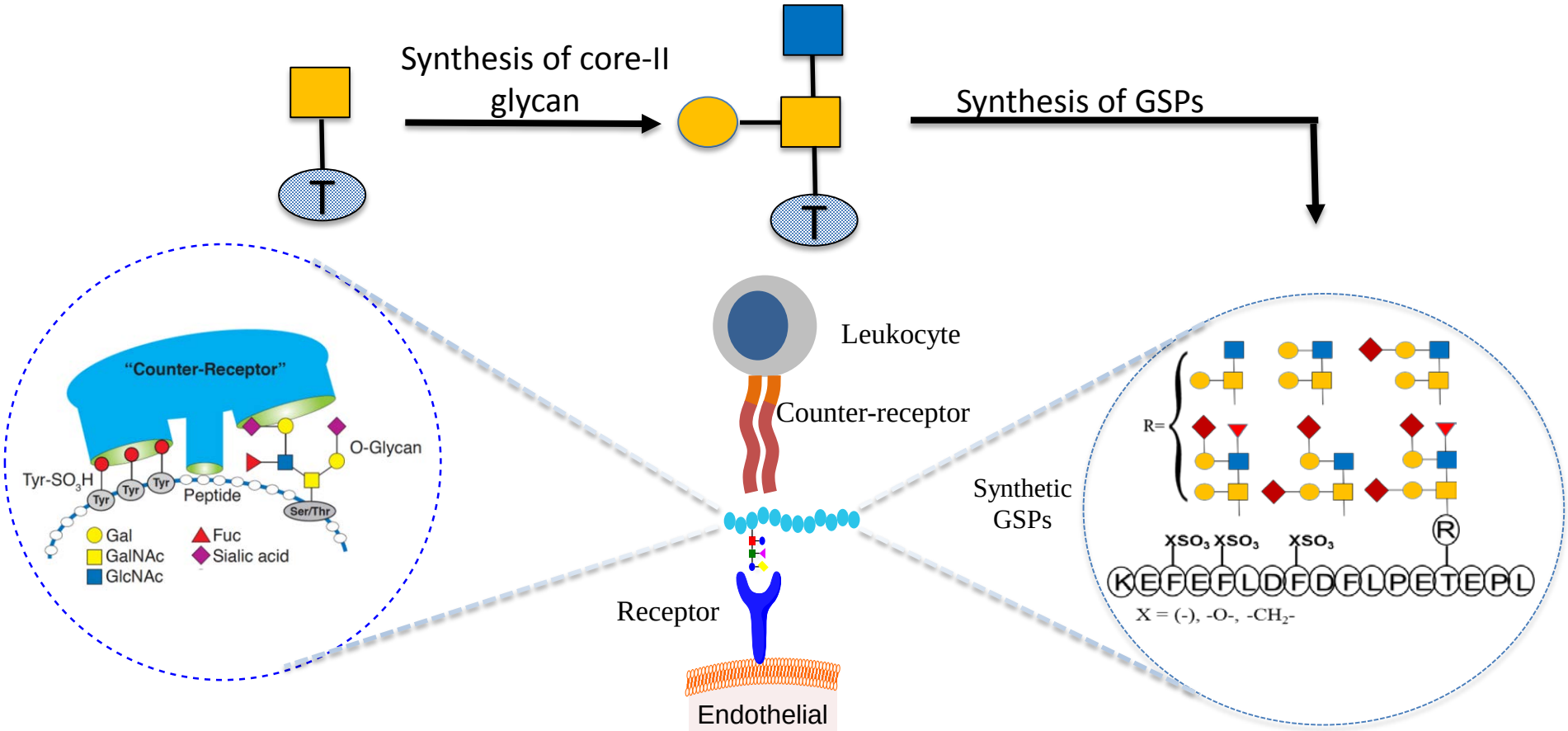


- Novel methods for large scale chemical release and multi-dimensional HPLC separation of natural glycans *Xuezheng Song, Emory University*
- Detailed structure characterization/confirmation of natural glycans *Vernon Reinhold, University of New Hampshire Glycomics Center*

U01GM116254 *Common Fund for Glycoscience*

Chaikof Group

Facile Synthesis of Glycosulfopeptides (GSPs) and Related Bioconjugates



- GSPs blocks receptor/counter-receptor interactions

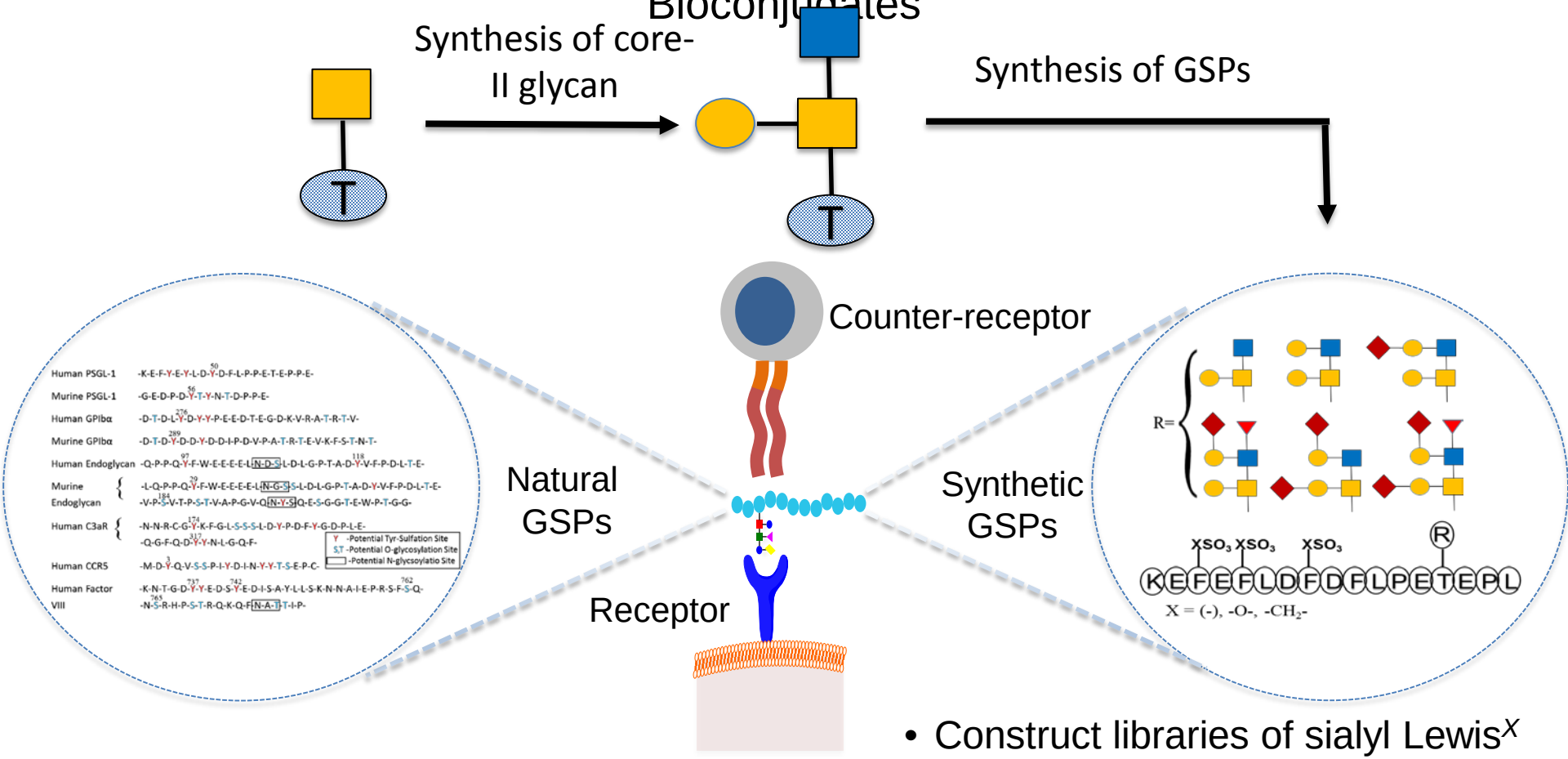
- Construct libraries of Sialyl Lewis^X bearing GSPs
- Total synthesis Of GSnP-6 and other glycosulfopeptides

Krishnamurthy, V. R.; Sardar, M. Y. R.; Ying, Y.; Song, X.; Haller, C.; Dai, E.; Wang, X.; Hanjaya-Putra, D.; Sun, L.; Morikis, V.; Simon, S. I.; Woods, R. J.; Cummings, R. D.; Chaikof, E. L. *Nat. Commun.* **2015**, *6*, 6387

UO1GM116196

Chaikof Group

Facile Synthesis of Glycosulfopeptides (GSPs) and Related Bioconjugates



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UO1GM116196