

Project	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
Establishment of AMBIC Reference Cell Lines and Media (January 2017)					Manuscript for first paper should be complete	Manuscript for second paper should be complete												
A. Elucidating Amino Acid Metabolism in CHO Cells (January 2017)																		
B. CleanCHO: Targeted Elimination of Secreted By-Products of Amino Acid Catabolism to Improve Volumetric Productivity (January 2019)	Finish analysis of fed-batch 13C-tracing Project Complete		Finish analyzing effect of 40+ metabolites Determine optimal genes to knock out			Evaluate impact of combinations of inhibitors Evaluate performance of engineered cell lines												Clean CHO project completion
Changes in Host Cell Protein During Extended Cell Culture (January 2017)		Project wrap up																
A. Understanding and Manipulating the Epigenome to Maximize CHO Cell (January 2017)																		
B. Determining Genome Stability in CHO Cell Lineages (January 2018)			Paper 1 Submission Wrap Up of first Epigenomics Project	ChAMP-Seq Experimental Results		Paper 2 Submission	Wrap up of Genome Stability Project											
C. ProductivityTesting the Targets: Validating the Best Spots for Targeted Insertion (January 2019)																		
Controlling Glycosylation and Increasing Cell Performance by Inhibiting Genes in the Glycolytic Pathway (May 2018)			Glycan analysis of IgG & evaluation of modified glycans Fed-batch experiments with Sigma cell line	Analyze performance of hexokinase-2 KO cells Transcriptomic & nucleotide sugar analysis		Project completion												
Quantifying Process Heterogeneity – “Smart Marbles” Analytics (January 2018)			Scale manufacturing and make smart marbles widely available to IAB															
Optimizing Nutrient Concentration Levels in Feed and Media Formulations (January 2018)				Effect of pH on multicomponent systems Additions to GUI based on mentor suggestions		Project completion Distribution and training for GUI software												
Integrated Model of CHO Cell Growth, Substrate Uptake and Intracellular Metabolism for Process Design and Control (January 2019)				Evaluate model fitting accuracy for variation of kinetic expressions		Project completion Automatic identification of optimal conditions to reach specific targets												
Exploring the Space of CHO Extracellular Vesicles & their Potential Applications (May 2018)						EV Characterization except RNAseq Impact of Evs on CHO culture						RNAseq EV Analysis						Cargo delivery protocol Project Completion
A. Characterizing Chemical Complexation and Speciation in order to Improve Medium and Feed Formulations (January 2018)																		
B. Free Metal Ion Activity Determinations in AMBIC Media (January 2019)	Visual Minteq training with mentor, individual sites Webinar/Tutorial		Fixed pH Fe(III) Citrate/EDTA exchange Timescales for metal ion exchange			Effects of pH shifts, temp change Visual Mineq implemented at IAB sites												
Understanding and Controlling ER Stress in High Secreting CHO Cells (January 2018)						Transcriptomic analysis Transcription factor overexpression studies												
Optimized In-Situ Surface Raman Spectroscopy (SERS) for On-Line Monitoring of Cell Culture Metabolites (January 2018)			Investigate SERS's capability to improve sensitivity of Raman probe Optimal design of SERS substrate & probe Numerical modeling of the SERS substrate			Testing & final design specs of optimized SERS set up Evaluation using AMBIC reference materials												
Establishing Markers for Stability and a Model for Accelerated Prediction of Production (In)stability (January 2019)	Implement assays for dsb measurements Implement PCR assays for measurement of DNA repair genes		Identify model system for stability studies	Perform dsb measurements and PCR assays on model system Validate PCR assays and dsb to co-relate to instability Accelerate instability prediction in CLD workflow via PCR assays and dsb measurements														
Identifying Inhibitory Waste By-Products in High Density CHO Cells (January 2018)	Control strategy			Wrap up and report writing														
Characterization of Media Precipitate and Determination of Equilibrium Constants and Precipitation Kinetics (January 2019)			Characterization method refinement	Fresh media precipitation experiments		Equilibrium experiments Pure component precipitation experiments Development of prediction tools												
A. Improving Process Characterization through Genome Scale Models and Metabolomics (January 2017)																		
B. AMBIC Media Feeding Strategy Design and Testing via a Model-Prediction GUI (January 2019)			Test project outcomes for ged-batch and perfusion with GUI and AMBIC materials			Design and deliver the GUI-based feeding strategy												
Increasing Genomic Stability and Antibody Titer Using Mammalian Artificial Chromosomes (January 2019)						Delivery of pre-MAC into CHO			Cloning IgG (& other) genes into pre-MAC									Testing IgG containing pre-MAC stability and titer over 60 generations Project completion