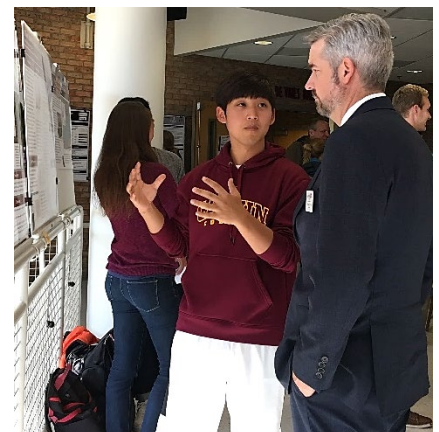
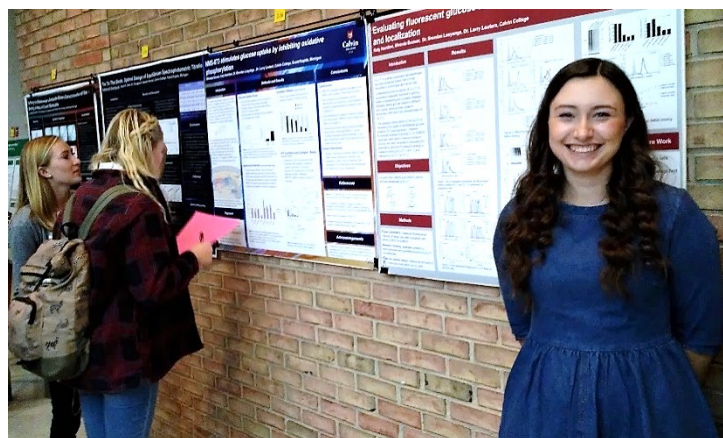
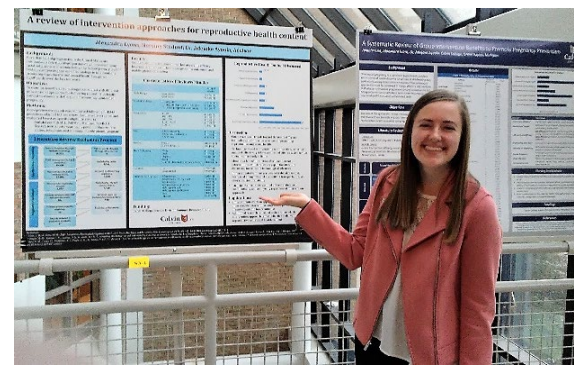
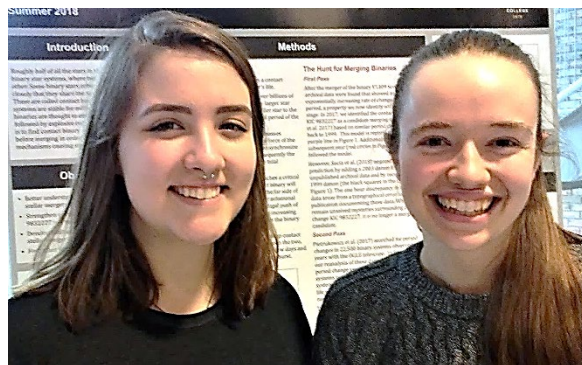


STEM Division Summer Research Poster Fair

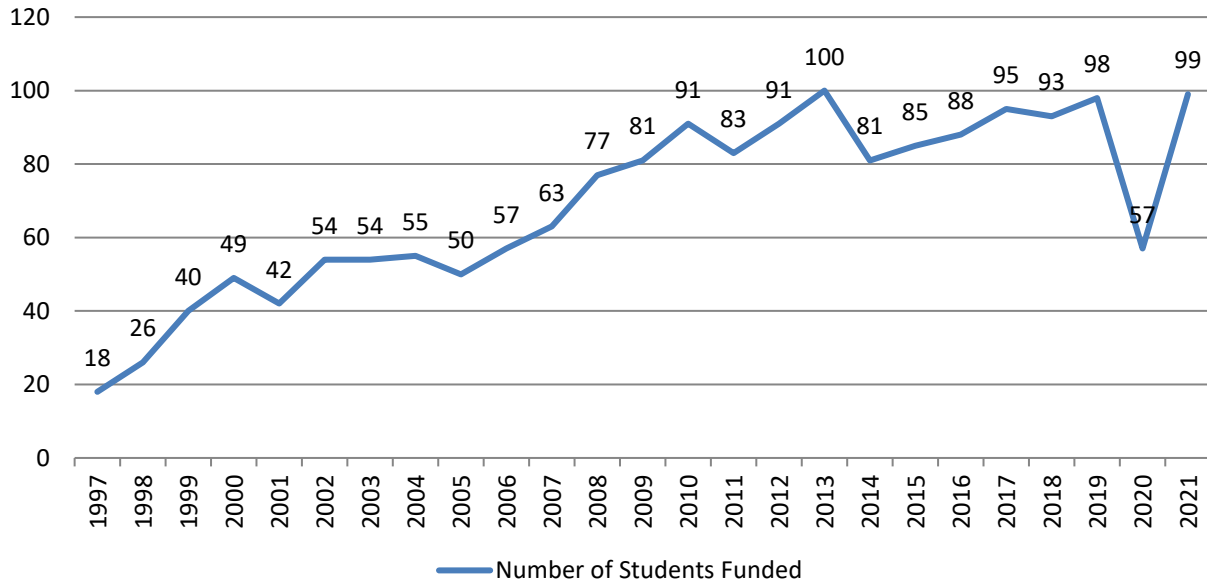
Friday, October 22, 2021
12:30 pm—3:30 pm
Science Complex



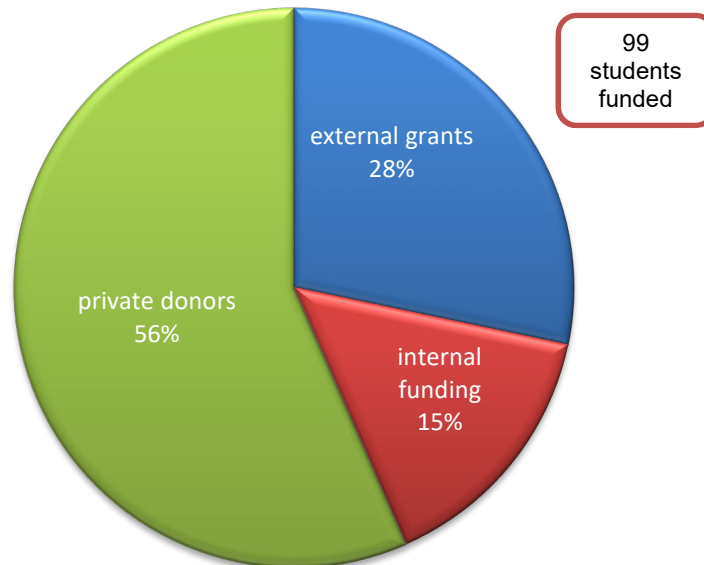
2021 Student Research Conducted in the Calvin STEM Division

99 students funded (54 women and 45 men) working with
36 Calvin professors on
73 different posters
28% were externally funded by grants from outside of Calvin College
56% were funded by private donors

Number of Students Funded, 1997-2021



Science Division Summer Research Fellowship Funding (2021)



Science Division Students Presenting Posters and their Locations

Numbering system:

DA: DeVries Atrium (0-x is lower level, 1-x for first floor, 2-x for second floor)

DH: DeVries Hall NH: North Hall SB: Science Building SL: Stairway Landing

Name	Location	Name	Location
Josian Aardema	DA 0-18	Fenton Lawler	DA 1-15
Eyram Adjei	DA 1-7	Haeun(Grace) Lee	DA 2-12
Dzifa Agbossey-Dimado	DA 2-13	Hayoung (Glory) Lee	SB 12
Emmanuella Akyeampong	DH 1	Abigail Liebetreu	DA 0-7
Nathan Anderson	SL - 1	Blerta Lika	DA 2-9
Addison Arendt	NH 1	Jia Luchs	DA 0-8
Brenna Beezhold	DH 8	Ivan(Judah) Manoraj	SB 10
Carly Bogdajewicz	DA 2-2	David Martinez-Vasquez	DA 0-9
Elizabeth Bolton	DA 1-9	Caleb Mathai	DA 0-8
Haleigh Bos	DA 1-10	Ashley Meyer	SB 8
Caitlyn Bott	NH 2	Saul Miranda	DA 0-18
Ryan Bouman	DA 1-3	Jose Munoz	DA 0-18
Sam Braak	DA 1-6	Braden North	DA 1-9
Dawson Buist	DA 1-13	Vennisa Owusu-Barfi	DA 1-4
Dat Cao	DA 0-18	Esther Park	DA 0-3
Kyrian Carley	SB 5	Hanvit Park	DA 2-11
Jay Cen	DA 1-8	Emma Pastoor	SB 8
Rachel Chee	DA 0-2	Zach Priebe	DH 6
Sua Cho	DA 1-12	Michael Rettstatt	DA 1-14
Anna Christiansen	DA 2-13	Christina Romano	DA 0-13
Tristan Contant	DH 2	Plinio Rosales-Lopez	DA 1-14
Josh DeYoung	SB 6	David Ruiters	SB 11
Eric Doorn	DH 3	Anjana Sainju	DA 2-8
Daniel Dreher	DA 1-10	Oula Salih	DA 0-14
George DuLaney	SB 3	Delaney Sall	DA 0-18
Jessica Eddy	DA 0-1	Emily Sall	DH 7
Einstein Essibu	SB 11	Eleanor Scheeres	DA 0-15
Sam Fyneweaver	DA 2-10	Emily Schellenboom	DA 0-16
Harold Gee	DA 1-11	Chase Scholtens	DA 1-10
Sarah Gibes	DA 0-14	Daniel Sculley	SB 7
Samuel Haileselassie	DA 2-4	Emilia Shokoohi	DA 0-6
Liz Hansen	SL - 2	Sam Smartt	SB 13
Zach Hartwig	DA 0-11	Ryan Storteboom	DA 1-15
Sadie Heeringa	SB 6	Suzanne Su	DA 0-17
Marian Henderson	DH 4	Rachael Tejevbo	DA 2-10
Lauren Henderson	SB 9	Derek Ten Pas	DA 2-1
Emma Hilbelink	DA 2-11	Adam Tjoelker	NH 4
Liam Hoogewerf	SB 1	Coleman Ulry	DA 1-13
Evan Hsu	DA 2-6	Martin Vander Schoot	DA 0-9
Onyinyechi Iheme	NH 3	Andrew Vander Tuig	DA 0-7
Julian Iturbe	DA 2-5	Madelyn Vander Veen	NH 5
Brianna Jansen	SB 7	Brayden Vander Weide	DA 1-9
Isaac Jonker	SB 2	Katie Van Dyke	SL - 2
Andrew Kapteyn	DA 0-7	Neil Van Kanegan	NH 4
Daniel Kim	DA 0-18	Matthew Vos	DA 1-5
Leah Knor	SB 4	Natalie Vredevoogd	DA 0-11
Simon Kok	DA 0-18	Ryan Vreeke	DA 2-4
Katherine Koning	DH 5	Andrew Vrieland	DA 2-7
Andrew Kornilov	DA 1-8	Duncan Waanders	DA 2-3
Sadie Kornoelje	DA 2-9	Rine Wakeman	DA 0-10
Valeria LaCroix	SB 5	Lucas Walker	DA 0-11
Fenton Lawler	DA 1-16	Nathan Wang	DA 2-9
Jenn Feng Lau	SB 9	Haley Weesies	DA 0-11

2021 Calvin University Science Division Summer Research Poster Fair

NUMBERING SYSTEM:

DA: DeVries Atrium (0-x is lower level, 1-x for first floor, 2-x for second floor)
DH: DeVries Hall NH: North Hall SB: Science Building SL: Stairway Landing

DeVries Atrium: Lower Level

DA 0-1

Author: **Jessica Eddy**

Title: *Intestinal Endothelial Cells Stimulate HIV Infection in Resting CD4+ T-Cells*

Funding: National Institute of Health

Supervisor: Anding Shen

It is known that HIV doesn't infect resting cells. However, when stimulated by Endothelial Cells, infection can actually occur. My project also compared intestinal, lymphatic, small intestinal and human umbilical cord endothelial cells with and without MHC class II, and the impact of memory and naive T-cells.

DA 0-2

Author: **Rachel Chee**

Title: *Roles of IL-6 and other factors in HIV infection of resting CD4+ T cells stimulated by intestinal endothelial cells*

Funding: National Institute of Health

Supervisor: Anding Shen

It has been seen that when stimulated by endothelial cells (EC), resting CD4+ T cells can be infected with HIV in their resting state. To gain a better understanding of the mechanism of intestinal endothelial cell (IEC) stimulation of resting CD4+ T cells during HIV infection, we examined the role of IL-6, 6 cytokines, and CD2.

DA 0-3

Author: **Esther Park**

Title: *Intestinal endothelial cells enhance HIV infection in activated CD4+ T cells and resting memory CD4+ T cells, with both CCR5 tropic and CXCR4 tropic viruses*

Funding: Calvin Science Research Fellowship

Supervisor: Anding Shen

Building from results/knowledge from previous research periods, we aimed to further elucidate the effects of different endothelial cell and virus types in HIV infection and latency formation. Specifically, our research team set up a variety of experiments to compare infection of R5-tropic virus with X4-tropic virus in infection of EC stimulated resting and activated CD4+ T cells.

DA 0-6

Author: **Emilia Shokoohi**

Title: *Using citizen science data to evaluate the breeding distribution of merlins, *Falco columbarius*, in Michigan*

Funding: Gordon Van Harn Family Student Research Fellowship

Supervisor: William Miller

A breeding pair of merlins was spotted nesting at Calvin University (Grand Rapids, MI) this past June, which would place this pair outside of the historic breeding range of merlins in Michigan. We used citizen science records, obtained from eBird (Cornell Lab of Ornithology), from the past 11 years to evaluate changes in the distributional patterns of merlins over this time period.

DA 0-7

Authors: **Andrew Kapteyn, Abigail Liebetreu, and Andrew VanderTuig**

Title: *Evaluating the Distribution of Blacklegged Ticks (Ixodes scapularis) in a Region of Recent Expansion*

Funding: Pierce Cedar Creek Institute, Klamer Biology Research Fund

Supervisor: William Miller

Blacklegged ticks have undergone a significant range expansion in the Lower Peninsula of Michigan over the last 20 years, with occurrences of Lyme disease increasing five-fold over the same period. In this study, we used abundance records collected from summer 2021 to evaluate distributional patterns of blacklegged ticks in western Michigan, which is along the current expansion front of this species in the Lower Peninsula.

DA 0-8

Authors: **Jia Luchs, Caleb Mathai**

Title: *Green Team – Ecological Restoration of Plaster Creek*

Funding: S-STEM Scholarship, Plaster Creek Stewards

Supervisors: Dave Warners/Deanna Geelhoed

This project reflects the experiences of high school students involved in the Green Team which is a group dedicated to education and practical restoration skills. Members of the Green Team were exposed to diverse leadership that incorporates the various cultures and knowledge of social and racial injustices through the watershed that we reside in.

DA 0-9

Authors: **David Martinez-Vasquez, Martin VanderSchoot**

Title: *Assessing transpiration and invasive species resistance capabilities of select native Michigan trees*

Funding: Rozema Science Research Fellowship and Wierenga Student Summer Research Fellowship, USDA Forest Service Great Lakes Restoration Initiative

Supervisor: Dave Warners

This summer, we initiated data collection for a long-term study that aims to determine which of the native Michigan tree species involved in a restoration project are the most efficient at performing transpiration and limiting populations of invasive reed canary grass.

DA 0-10

Author: **Rine Wakeman**

Title: *Native Plants and Landscaping at Calvin University*

Funding: Calvin Science Research Fellowship

Supervisor: Dave Warners

This project involves the continued care for naturally planted sites on campus. How can the traditional aesthetics of landscaping be combined with creation care and native Michigan plants?

DA 0-11

Authors: **Lucas Walker, Haley Weesies, Zach Hartwig, and Natalie Vredevoogd**

Title: *Grand Rapids Flora Then and Now: Emma Cole Project 2021*

Funding: Emma Cole Project, S-STEM Scholarship, William H. and Celia I. Dornbush/DeVries Family Student Research Fellowship

Supervisors: Dave Warners/Garrett Crow

Emma Cole, a botanist and science educator who lived and worked in Grand Rapids in the late nineteenth century, wrote a book entitled "Grand Rapids Flora" that documented all plants growing naturally in the Grand Rapids area at the time. Since then, no complete botanical inventory has been done of the area, so our project sought to compare the botany of remnant natural areas now to her findings over one century ago.

DA 0-13

Author: **Christina Romano**

Title: *COVID-19 Worship Study*

Funding: Calvin Institute for Christian Worship

Supervisors: Erica Boldenow/Kelly DuBois

This project sought to understand how the COVID-19 pandemic has influenced corporate worship practices in Christian churches across America. The study used a survey to collect data on topics such as mitigation practices, discipleship and outreach accommodations, and childcare options, and confidentially shared this data on a public website (www.covidworshipstudy.com).

DA 0-14

Authors: **Sarah Gibes, Oula Salih**

Title: *Microbial Responses to Green Infrastructure in Plaster Creek Watershed*

Funding: Clarence Star and Arlene Talen Star Student Research Fellowship, William H. and Celia I. Dornbush/DeVries Family Student Research Fellowship

Supervisor: Kelly DuBois

Plaster Creek Stewards built a watershed at Shadyside Park in Dutton. This project investigated the microbial contamination at the site.

DA 0-15

Author: **Eleanor Scheeres**

Title: *Environmental Contaminants and Bacterial Infection: Effect on Pregnant Murine Models Co-exposed to Trichloroethylene (TCE) and Group B Streptococcus (GBS)*

Funding: Dr. Daniel J. Visser Student Research Fellowship in the Medical Sciences

Supervisor: Erica Boldenow

We previously conducted an experiment looking at how the coexposure of an environmental contaminant (trichloroethylene) and a bacterial pathogen (Group B Streptococcus) modulate the immune system of pregnant rat models. This summer, we had the opportunity to conduct analysis on collected tissues, looking at how cytokine, matrix metalloproteinase, and prostaglandin (proteins involved with pregnancy functioning) were affected by this co-exposure.

DA 0-16

Author: **Emily Schellenboom**

Title: *Environmental Toxin Trichloroethylene (TCE) and the Immune System: Effects of TCE metabolite S-(1,2-Dichlorovinyl)-L-cysteine (DCVC) on THP-1 Cells infected with Lipopolysaccharide (LPS) or Group B Streptococcus (GBS)*

Funding: Calvin Science Research Fellowship

Supervisor: Erica Boldenow

This summer we examined the effects of the environmental toxin trichloroethylene on human macrophage-like cell's ability to perform immune functions after being exposed to a known inflammation inducer (lipopolysaccharide or Group B Streptococcus). Previous research showed some immune system inhibition, but further investigation was required to gather a more complete picture of immune system impacts.

DA 0-17

Author: **Suzanne Su**

Title: *Investigation of CV33 from Cephalotes*

Funding: Clarence Star and Arlene Talen Star Student Research Fellowship

Supervisor: John Wertz

CV33 is a bacteria isolated from Cephalotes which potentially contribute to provide N resources for Turtle ants. An investigation for this bacteria was processed to discover some of its characteristics.

DA 0-18

Authors: **Josian Aardema, Dat Cao, Daniel Kim, Simon Kok, Saul Miranda, Jose Munoz, and Delaney Sall**

Title: *Stormwater Capture via Green Infrastructure in the Plaster Creek Watershed*

Funding: Grand River Rainscaping Partnership, MI Dept. of Environment, Great Lakes and Energy (EGLE), Klamer Biology Research Fund

Supervisors: Dave Warners/Deanna Geelhoed

Plaster Creek Stewards (PCS) aims to restore the local watershed by means of education, research and “on the ground” restoration. The focus of their restoration work is reducing stormwater runoff containing high amounts of sediment, chemicals, and other pollutants. A variety of green infrastructure practices were used to accomplish this goal.

Stairway Landing (between level 0 and level 1)

SL - 1

Author: **Nathan Anderson**

Title: *Lay Down Your Arms: Does a Novel Avian Schistosome Cause Swimmer's Itch?*

Funding: William H. and Celia I. Dornbush/DeVries Family Student Research Fellowship

Supervisor: Randall DeJong

We exposed human volunteers to both a well-known and a novel avian schistosome to compare their ability to cause swimmer's itch. We also compared the reaction of the parasites to α -linolenic acid, a known stimulant of avian schistosome penetration behavior.

SL - 2

Authors: **Katie VanDyke, Elizabeth Hansen**

Title: *Flat Iron Lake Phenology Study and Floral Inventory*

Funding: Fritz and Carol Rottman Biology Fellowship

Supervisor: Dave Warners

A longitudinal study has been occurring yearly at Flat Iron Lake Preserve on the effects of climate change on flowering periods. Species were identified daily and then compiled into a spreadsheet from which the flowering periods of selected species could be compared to prior years.

DeVries Hall Level One

DA 1-3

Author: **Ryan Bouman**
Title: *Visualizing the Electronic Structure of Atoms*
Funding: Computational Chemistry Research Fund
Supervisor: Roger DeKock

Visualizing the electronic structure of atoms was done using a website built with a JavaScript framework. This framework sets up a suitable work environment capable of accomplishing what is necessary for visualizing atoms.

DA 1-4

Author: **Vennisa Owusu-Barfi**
Title: *The Electronic Structure of Atoms*
Funding: Computational Chemistry Research Fund
Supervisor: Roger DeKock

I will be presenting on the Electronic Structure of Atoms under the field of Quantum Chemistry. Our work focused on the relationship between atomic radii and ionization energy.

DA 1-5

Author: **Matthew Vos**
Title: *Imaging the ER Without Stressing it Out*
Funding: Dr. Thomas J. Hoogeboom Memorial Research Fellowship in Chemistry and Biochemistry
Supervisor: Laura Westrate

Using processes like CRISPR and RUSH, we photographed fluorescent images of the rough endoplasmic reticulum to further understand and categorize this organelle.

DA 1-6

Author: **Sam Braak**
Title: *Synthesis of Cys-Tyr Cross-Linkage*
Funding: National Science Foundation,
Supervisor: Dave Benson

Using various laboratory and analytical techniques, a method for synthesis of the cys tyr cross link was created. Analysis of the target compound was completed using nmr, hplc, and mass spec.

DA 1-7

Author: **Eyram Adjei**
Title: *Visualizing the ER without stressing it out*
Funding: Kallemyn Summer Research Fellowship
Supervisor: Eric Arnoys/Laura Westrate

The goal of this project was to better characterize fluorescent detection systems and compare protein localization with ER structure and dynamics for three different methods. This project was concerned with the methods of transient overexpression, stable overexpression, and CRISPR/Cas knock-in of fluorescent proteins.

DA 1-8

Authors: **Jay Cen, Andrew Kornilov**

Title: *Effects of ER Morphology on Protein Distribution*

Funding: Klammer Chemistry Research Fund, National Science Foundation

Supervisors: Laura Westrate/Eric Arnoys

We described the effects of ER morphology on protein diffusion and distribution. We looked at the structure and ER matrix as well as three-way junctions to come to our conclusions.

DA 1-9

Authors: **Elizabeth Bolton, Braden North, and Brayden VanderWeide**

Title: *Mammalian Sec Proteins Expression and Purification*

Funding: Klammer Chemistry Research Fund, Luke and Pauline Schaap Summer Research Fellowship

Supervisor: Eric Arnoys

Sec proteins are located in the endoplasmic reticulum and function in creating vesicles. This summer we attempted to express and purify these proteins.

DA 1-10

Authors: **Haleigh Bos, Daniel Dreher, and Chase Scholtens**

Title: *Synthesis of Substituted Indolizines from 2-Propargyloxypryidines and Acetoacetates*

Funding: National Science Foundation

Supervisor: Carolyn Anderson

This summer, the focus was placed on developing methodologies based around the Au(I) catalyzed synthesis of indolizines with acetoacetates. When the reaction is done with acetoacetates, the resulting indolizine contains an ester group.

DA 1-11

Author: **Harold Gee**

Title: *Not all who use Calculus are White Men*

Funding: Calvin Science Research Fellowship

Supervisor: Herb Fynewever

The project was meant to help STEM (Science, Technology, Engineering, and Math) students succeed and persist in STEM fields, and this year's focus was on introductory Calculus since many STEM students take the course. We are implementing a diverse curriculum to better retain diverse students, as seeing people who look like themselves in the curriculum could help them better engage in class and therefore persist.

DA 1-12

Author: **Sua Cho**

Title: *Not all Mathematicians are White Men*

Funding: Calvin Science Research Fellowship

Supervisor: Herb Fynewever

We developed and implemented a diverse and inclusive Calculus curriculum, which aims to make the point that not all mathematicians are white men. To accomplish our goal, we did a textbook analysis and research on mathematicians of color and female mathematicians who made contributions in Calculus.

DA 1-13

Authors: **Dawson Buist, Coleman Ulry**

Title: *SIVVU.org*

Funding: National Science Foundation, DeKock Chemistry Summer Research Fellowship

Supervisor: Douglas Vander Griend

We created a high-level chemistry calculation website that simulates spectrophotometric data. This site will be used for research purposes and general chemistry labs.

DA 1-14

Authors: **Plinio Rosales-Lopez, Michael Rettstatt**

Title: *Molecular Dynamics Simulation of a Metal/Ligand Complex*

Funding: The Rollin M. Gerstacker Foundation Student Research Fellowship, Pfizer Student Research Fellowship

Supervisor: Douglas Vander Griend

My project consisted of performing molecular dynamics simulation on a metal/ligand system to support the advance methodology for the proper methodology of spectrophotometer data.

DA 1-15

Author: **Ryan Storteboom**

Title: *Determining Binding Strength and Mode for Ethylenediamine with Ni(II) in Aqueous Solution*

Funding: Karen Muyskens Memorial Summer Research Fellowship in Chemistry

Supervisor: Douglas Vander Griend

Ethylenediamine is a bidentate ligand that when mixed with a metal cation like Nickel(II) in water, numerous competing species can and do form. This research focused on the difficult task of identifying all these competing species, quantifying their concentrations and binding strength by analyzing color shifts in the solution.

DA-16

Author: **Fenton Lawler**

Title: *Thermodynamic characterization of aqueous hairpin peptides coordinating to Cu(II) and Zn(II)*

Funding: The Arnold and Mabel Beckman Foundation

Supervisor: Douglas Vander Griend

Our lab explored key insights on the folding dynamics and characterization of beta hairpin peptides called Tryptophan Zippers. CD Thermal and UV-vis were performed to determine several thermodynamic properties.

DeVries Atrium Level Two

DA 2-1

Author: **Derek Ten Pas**

Title: *Freshwater Spring Capture: The CODEINSE Method*

Funding: Calvin Engineering Department

Supervisors: Robert Hoeksema/Chad Tatko/Julie Wildschut

A simple, improved technique of freshwater spring capture has been developed in Ecuador's Chimborazo Province by a local organization, CODEINSE, to protect spring water sources for community water supply. Research done by the Clean Water Institute aims to verify this new practice and spread awareness of its benefits.

DA 2-2

Author: **Carly Bogdajewicz**
Title: *Electrolysis Water Treatment in Rural Ecuador*
Funding: Clean Water Institute
Supervisor: Chad Tatko/Julie Wildschut

Working with the Clean Water Institute, two electrolysis systems were tested for suitability in rural Ecuador water systems. A trip was made to the field in Ecuador where water systems were evaluated for quality and to find a potential implementation of electrolysis.

DA 2-3

Author: **Duncan Waanders**
Title: *Calvin Engineering Lab Development*
Funding: Engineering Department
Supervisor: Chris Hartemink

This summer, Calvin's Engineering Department acquired a new thermodynamics internal combustion lab. This poster will also describe the process of designing and testing an EEG for the new biomedical minor.

DA 2-4

Authors: **Samuel Haileselassie, Ryan Vreeke**
Title: *Seeing and Hearing Parallel Computing*
Funding: National Science Foundation
Supervisor: Joel Adams

We upgraded the installation process and version of both the TSGL and TSAL code libraries. These libraries are now updated and easy to install and use.

DA 2-5

Author: **Julian Iturbe**
Title: *Useful energy in the commercial sector of Japan*
Funding: Zylstra Sustainability
Supervisor: Matt Heun

We looked up and researched useful energy allocations and machines within different sectors throughout the globe to further understand the difference and proportion between primary energy and energy that can be consumed or have a determined purpose.

DA 2-6

Author: **Evan Hsu**
Title: *"Runoff" with Calculations from the Curb*
Funding: Zylstra Sustainability
Supervisor: Julie Wildschut

My project this summer was working on redesigning the curb cut rain garden calculator system for Plaster Creek Stewards. This involves updating data, creating a one-page design, and testing functions to compute calculations and make it easy to use.

DA 2-7

Author: **Andrew Vrieland**
Title: *Designing Computer Applications to Model Geophysical Data for Siting Wells in Developing Countries*
Funding: Zwagerman Summer Research Fellowship
Supervisor: Victor Norman

We engaged in updating, testing, and designing GUI's for open-source software to be used to site wells in developing countries.

DA 2-8

Author: **Anjana Sainju**
Title: *Final to Useful Energy in Economic sectors of the US*
Funding: Zylstra Sustainability
Supervisor: Matt Heun

This summer I worked on finding data on end use allocation of final energy in different economic sectors for different countries. From those data and the efficiency of machines using those energies, we computed useful energies that contributed to the main database.

DA 2-9

Authors: **Sadie Kornoelje, Blerta Lika, and Nathan Wang**
Title: *Household Water Filter Distribution Leads to Reduction of Diarrhea in Liberia*
Funding: Clean Water Institute, Jansma Family Research Fund in the Sciences and Business Fellowship, Clean Water Institute
Supervisor: Stacy DeRuiter

We looked at filter efficacy and diarrheal rates in Liberia. We also reported some of our work with Geo and Public Health divisions at Calvin.

DA 2-10

Authors: **Sam Fyneweaver, Oghenekevwe (Rachael) Tejevbo**
Title: *TagTools: Software Supporting Animal Research*
Funding: Kuiper Applied Math
Supervisor: Stacy DeRuiter

The TagTools software package helps biologists interpret animal behavior, providing functions that analyze data taken from devices attached to animals, called "tags". Our project bolstered this package with new vignettes (interactive teaching modules), a new website, cross-platform compatibility (Matlab, Octave, and R), and the beginnings of a fourth platform (Python).

DA 2-11

Authors: **Emma Hilbelink, Hanvit Park**
Title: *A Systematic Review of Approaches Used for Reproductive Health Interventions*
Funding: Jansma Family Research Fund in the Sciences and Business Fellowship
Supervisor: Adejoke Ayoola

We compared the different intervention methods of reproductive health intervention and observed its effectiveness. We conducted this review through research using databases, data analysis, and statistical comparisons.

DA 2-12

Author: **Haeun (Grace) Lee**
Title: *The impact of social determinants of health on the experience of informal caregiving for adults in low socioeconomic urban settings: A literature review*
Funding: Dr. Daniel J. Visser Student Research Fellowship in the Medical Sciences
Supervisor: Dawn Frambes

We completed a database search to analyze evidence about the experience of informal caregivers living in low socioeconomic urban settings. 11 relevant articles described the caregivers' needs for information about care recipient's health conditions and interaction with health providers that applied to their specific situations.

DA 2-13

Authors: **Dzifa Agbossey-Dimado, Anna Christiansen**

Title: *The Influence of Participation in a Summer Health Camp on Girls' Interest in Pursuing Healthcare Professions*

Funding: Henry and Peggy Tazelaar Summer Student Research Fellowship

Supervisor: Adejoke Ayoola

Calvin University's Health Education and Leadership Training for a Hopeful future (H.E.A.L.T.H.) Camp is a week-long summer camp that aims to increase health knowledge and interest in healthcare professions among young girls ages 9-15 of diverse ethnic and socioeconomic backgrounds. This study sought to determine the influence of H.E.A.L.T.H. Camp participation on young girls' interest in pursuing a healthcare profession in the future, particularly among participants from underrepresented groups.

DeVries Hall

DH 1

Author: **Emmanuella Akyeampong**

Title: Ferroptosis and Sarcolemma Injury in Duchenne Muscular Dystrophy

Organization: University of Michigan

Funding: FCVC SURF

Supervisor: Professor Daniel Michele, Hsin-Yu Chen

Duchenne Muscular Dystrophy (DMD) is a rare, X-linked recessive genetic disorder which is caused by null mutations in dystrophin and affects the structure and function of striated muscle of affected patients. Clinically, this condition is characterized by muscle degeneration, progressive symmetrical muscular weakness, cardiomyopathy, and high levels of serum creatine kinase which is hypothesized to be due to loss of sarcolemma integrity. In other types of cardiac muscle injury such as ischemia, muscle membranes are compromised by a form of iron-dependent cell death called ferroptosis. Therefore, the aim of this summer project was to determine if activation of ferroptosis contributes to loss of sarcolemma integrity in DMD and to test the effectiveness of Ferrostatin-1, a ferroptosis inhibitor, to protect muscle injury in dystrophin-deficient mdx mice, the mouse model of DMD.

DH 2

Author: **Tristan Contant**

Title: Extending Coverage of Specialized Metabolism in Plant Metabolic Reconstructions

Organization: Argonne National Laboratory

Funding: United States Department of Energy

Supervisor: Samuel Seaver, Ph.D.

PlantSEED is a tool for plant genome/transcriptome annotation and in silico metabolic reconstruction. We extended the coverage of PlantSEED by including specialized metabolic pathways to the framework.

DH 3

Author: **Eric Doorn**

Title: *Reduce the Off-target Accumulation of Radiopharmaceuticals in Kidney Using Nephilysin-activated Cleavable Linkers*

Organization: University of Iowa

Funding: Biomedical Scholars Summer Undergraduate Program

Supervisor: Dr. Mengshi Li, Dr. Nicholas Baumhover, Dr. Michael K. Schultz

Using a radiolabeled low molecular weight peptide, an inserted cleavable linker may help to reduce the accumulation of radiation and toxicity in the kidney for metastatic melanoma patients.

DH 4

Author: **Marian Henderson**

Title: *Efficacy of AAV-mediated gene replacement therapy for MYBPC3-related hypertrophic cardiomyopathy*

Organization: University of Michigan

Funding: Frankel Cardiovascular Center, Tenaya Therapeutics

Supervisor: Adam Helms, Ryan Bebej

This poster will provide necessary background information about the mechanisms of hypertrophic cardiomyopathy and AAV-gene replacement therapy. Analyses of tissue contractility and protein expression will be presented in dot plots, along with a flow chart showing how these analyses fit into the experimental workflow.

DH 5

Author: **Katherine Koning**

Title: Regulation of Apple Acidity: Is it Protein Turnover of ALMT Transporter?

Organization: Cornell University

Funding: National Science Foundation

Supervisor: Miguel Pinos

This research increases the understanding of the regulation of the aluminum activated malate transporter (ALMT) family, particularly the MdALMT9 tonoplast transporter that plays a major role in determining apple fruit's acid levels. The project addressed the question, does the truncation of the ALMT transporter affect protein turnover as a method of regulation?

DH 6

Author: **Zach Priebe**

Title: *Synthesis and Biological Evaluation of Grp94 Selective Inhibitors*

Organization: University of Notre Dame

Supervisor: Brian Blagg, Kyler Pugh

I worked to design Grp94 selective inhibitors to prevent the metastasis of cancer. In designing inhibitors specific for Grp94, we hope to avoid a phenomenon known as the Heat Shock Response.

DH 7

Author: **Emily Sall**

Title: *Examining the role of non-canonical Wnt receptors in pancreatic cancer cell motility*

Organization: Van Andel Institute

Funding: Frederik and Lena Meijer Foundation

Supervisor: Dr. Bart Williams, Dr. Payton Stevens

Fzd6, a non-canonical Wnt receptor, and its co-receptor Ryk, which are upregulated in aggressive pancreatic cancer, were knocked down with shRNA in the Panc1, MiaPaca2, and BxPC3 pancreatic cancer cell lines. After inducing Wnt ligand starvation via Porcupine inhibition, a wound-healing scratch assay with Wnt5a stimulation was done to examine the effects of Fzd6 and Ryk knockdown on pancreatic cancer cell motility.

DH 8

Author: **Brenna Beezhold**

Title: *Investigating the relationship between GCase and pathology in Parkinson's disease*

Organization: Van Andel Institute

Funding: Meijer Foundation

Supervisor: Dr. Michael Henderson

We researched the impact of genetic and idiopathic types of Parkinson's disease on the post-mortem pathology in patients' brains staining for Alpha synuclein, Tau, Amyloid beta, and TDP -43.

Science Building

SB 1

Author: **Liam Hoogewerf**

Title: *The Synthesis of HAMC (7-amino-6-hydroxy-4-methyl-coumarin)*

Funding: National Science Foundation

Supervisor: Mark Muyskens

My project was to synthesize a completely new molecule for further research by the rest of my research team. This molecule is highly fluorescent and is somewhat easy to synthesize given the starting material with which I was supplied.

SB 2

Author: **Isaac Jonker**

Title: *Photophysical Properties of Fluorescent Coumarins*

Funding: Thedford P. Dirkse Summer Research Fellowship

Supervisor: Mark Muyskens

The photophysical properties of fluorescent coumarins were explored, especially relative quantum yield, absorbance and emission when a coumarin interacts with boric acid, and HPLC elution times.

SB 3

Author: **George DuLaney**

Title: *Energetic Topography of Hydroxyl Rotation in Aesculetin*

Funding: Luke and Pauline Schaap Summer Research Fellowship

Supervisor: Mark Muyskens

We wanted a rationale for why the anion of aesculetin was more fluorescent than the neutral form. Using computational modeling, we found a possible explanation in the energetic barriers to hydroxyl rotation in each form.

SB 4

Author: **Leah Knoor**

Title: *The Photophysical Properties of Grevillone and Methylgrevillone*

Funding: The Arnold and Mabel Beckman Foundation

Supervisors: Mark Muyskens

Coumarins are naturally produced compounds that can be used as antioxidants, antibiotics, fluorescent probes, and more. We have characterized the fundamental physical and fluorescent properties of two important coumarins: grevillone and methylgrevillone.

SB 5

Authors: **Kyrian Carley, Valeria LaCroix**

Title: *Optimizing Zebrafish Care and CRISPR-Cas9 Genetic Modification*

Funding: Ken and Marsha Wierda Summer Research Fellowship, Rozema Science Research Fellowship, Jansma Family Research Fund in the Sciences and Business Fellowship

Supervisor: Amy Wilstermann

After we optimized care, breeding, and fry raising, we genetically modified zebrafish embryos using a two-part RNA CRISPR-Cas9 system, performing a knockout of the zebrafish pigment gene *slc45a2* and creating a colony of albino zebrafish. Our overall aim is to create a zebrafish model system for rare disease by using CRISPR-Cas9 to generate specific BCS1L mutations in the zebrafish.

SB 6

Authors: **Josh DeYoung, Sadie Heeringa**

Title: *Molecular Dynamics of BCS1L: A New Homology Model and the Structural Impact of Pathogenic Mutations*

Funding: Thedford P. Dirkse Summer Research Fellowship, Storteboom Summer Research Fellowship

Supervisors: Rachael Baker/Amy Wilstermann

Three rare diseases with a huge variation of symptoms are connected to one mitochondria protein, BCS1L. We used molecular dynamic simulations to model BCS1L in order to find the structural impacts mutations have.

SB 7

Authors: **Brianna Jansen, Daniel Sculley**

Title: *Bioinformatics Tools*

Funding: Enno Wolthuis Summer Student Research Fellowship, Storteboom Summer Research Fellowship

Supervisor: Rachael Baker

This summer we dove deep into bioinformatics tools to investigate BCS1L and develop a gene profile. We looked at pathogenicity data, interaction data, protein modeling and more in the hopes of eventually identifying a second function or pathway of BCS1L.

SB 8

Authors: **Emma Pastoor, Ashley Meyer**

Title: *BCS1L Interactors and Rieske Docking*

Funding: Ken and Marsha Wierda Summer Research Fellowship, Enno Wolthuis Summer Student Research Fellowship

Supervisor: Rachael Baker

Emma datamined for BCS1L protein interactors and Ashley used a program called YASARA to make docking models of BCS1L with one of its interactors, the Rieske protein. We hope to use similar modeling techniques in the future to understand other BCS1L interactions and hopefully identify a novel function or pathway of BCS1L.

SB 9

Authors: **Lauren Henderson, Jenn Feng Lau**

Title: *Using MESA to Test Our Theory of Contact Binary Star Evolution*

Funding: The John Van Zytveld Student Summer Research Fellowship, Jansma Family Research Fund in the Sciences and Business Fellowship

Supervisor: Larry Molnar

Contact binaries consist of two stars orbiting each other so closely that they share an outer atmosphere. This summer we used MESA, a stellar modelling program, to model contact binary star evolution from their formation until they reach instability (at which point the stars spiral together and explode!).

SB 10

Author: **Ivan 'Judah' Manoraj**

Title: *Improving Temperature Control for Studying Lipid-Ion Channel Biophysics*

Funding: Wierenga Student Summer Research Fellowship

Supervisor: Loren Haarsma

Temperature affects lipid molecule biophysical properties which in turn affect ion channel characteristic open dwell times. We significantly improved our ability to control and measure our sample's temperature in a thermally and electrically isolated chamber with low noise.

SB 11

Authors: **Einstein Essibu, David Ruiter**
Title: *Data Analysis of Gramicidin-A Ion Channel Activity*
Funding: Kanis Summer Research Fellowship
Supervisor: Loren Haarsma

Ion channels allow useful chemicals to travel in and out of cells. This project aimed to analyze the effect of temperature on the duration of channel openings.

SB 12

Author: **Hayoung (Glory) Lee**
Title: Making an Extendable Model of the Lamellar Phase
Funding: Michael and Cheryl Brandsen Student Research Fellowship
Supervisor: Paul Harper

Our desire was to make a model of the lamellar phase that can be readily extended to the hexagonal phase, to better understand lung protein-lipid interactions.

SB 13

Author: **Sam Smartt**
Title: Luminous Documentary
Supervisor: Larry Molnar

Luminous is a feature documentary that tells the story of Calvin Astronomy professor Larry Molnar's bold prediction of a luminous red nova in the constellation of Cygnus in 2022 and follows his years-long journey to test that prediction to see whether he is right. The film is directed and produced by Calvin Communication professor Sam Smartt and will be screening in the CFAC Main Auditorium on October 23rd, 2021 at 7:30pm. The event is free and open to the public.

North Hall

NH 1

Author: **Addison Arendt**
Title: *How to Name a Place? A New Populated Place Map of Liberia*
Funding: Clean Water Institute
Supervisor: Jason VanHorn

We used ArcGIS Pro and data from Sawyer International to make the most up to date map of where villages are in the country of Liberia.

NH 2

Author: **Caitlyn Bott**
Title: *Influence of Grain Size and Soil Moisture on Ground Penetrating Radar at Dunes 1 and 2, Hoffmaster State Park*
Funding: Michigan Space Grant Consortium and Calvin Science Research Fellowship
Supervisor: Melinda Higley

Using Ground Penetrating Radar, this project aimed to study the subsurface layers of Dune 1 and Dune 2 at Hoffmaster State Park. This study is important in understanding the history and changes of this environment during erosional and depositional events.

NH 3

Author: **Onyinyechi Iheme**

Title: *Sediment characteristics of the upper units of landslide-prone bluffs along the Southwest shoreline of Lake Michigan.*

Funding: Michigan Space Grant Consortium

Supervisor: Melinda Higley

My research goal was to determine the interlayered sediments in failed bluffs along the shoreline of Lake Michigan with the use of GPR. The Ground Penetrating Radar is a geophysical nondestructive path to learning about the sub-surface materials of the earth.

NH 4

Author: **Adam Tjoelker, Neil VanKanegan**

Title: *Bathymetry Based Modeling of Subaxial Magma Flows Under the Mid-Atlantic Ridge, 0 to 30° N*

Funding: Vermeer Grant, Davis Young Research Fellowship in Geology

Supervisor: C. Renee Sparks

This project used bathymetry data to model magma flow beneath the Mid-Atlantic Ridge. This project focused on modeling and explaining lateral magma flow, and the processes that interact with magma at the Mid-Atlantic Ridge.

NH 5

Author: **Madelyn VanderVeen**

Title: *A Portrait of Post-Industrial Portland, Oregon*

Funding: McGregor Scholars Program

Supervisor: Mark Bjelland

This project examined two former industrial districts of Portland, Oregon. In the shadow of lost manufacturing jobs, toxic residues, significant public investment, and rising rents, the transition to postindustrial cities reflects a growing emphasis on urban livability and sustainability.

2021 Student Research Conducted Off-Campus

Argonne National Laboratory, Lemont, IL

Boyce Thompson Institute, Cornell University, Ithaca, NY

University of Iowa, Iowa City, IA

University of Michigan, Ann Arbor, MI

University of Notre Dame, South Bend, IN

Van Andel Institute, Grand Rapids, MI

2021 Science Division Summer Research Program Funding

The Arnold and Mabel Beckman Foundation
The Michael and Cheryl Brandsen Student Research Fellowship
Davis Young Research Fellowship in Geology
The DeKock Chemistry Summer Research Fellowship
The Thedford P. Dirkse Summer Research Fellowship
The William H. and Celia I. Dornbush DeVries Family Student Research Fellowship
The Rollin M. Gerstacker Foundation Student Research Fellowship
The Dr. Thomas J. Hoogeboom Memorial Research Fellowship in Chemistry and Biochemistry
The Jansma Family Research Fund in the Sciences and Business
Kallemyn Summer Research Fellowship
The Kanis Summer Research Fellowship
The Bernard Klamer Biology Research Fund
The Bernard Klamer Chemistry Research Fund
The Jack and Lois Kuipers Applied Mathematics Endowment
Karen Muyskens Memorial Summer Research Fellowship in Chemistry
Pfizer Student Research Fellowship
The Fritz and Carol Rottman Student Research Fellowship
The Harvey Rozema Student Research Fellowship
The Luke and Pauline Schaap Summer Research Fellowship
The Storteboom Summer Research Fellowship
The Clarence (Bud) Star and Arlene Talen Star Student Research Fellowship
The Henry and Peggy Tazelaar Summer Student Research Fellowship
The Gordon Van Harn Family Student Research Fellowship
The John Van Zytveld Summer Student Research Fellowship
The Hubert A. Vander Plas Memorial Student Research Fellowship
The Dr. Daniel J. Visser Student Research Fellowship in the Medical Sciences
The Wierenga Family Foundation Summer Research Fellowship
The Ken and Marcia Wierda Summer Research Fellowship
The Enno Wolthuis Summer Student Research Fellowship
Zwagerman Summer Research Fellowship
Program for Sustainability Engineering, gift from Joel and Linda Zylstra
mma Cole Project
Computational Chemistry Research Fund
Calvin Clean Water Institute
Cavin Institute for Christian Worship
Calvin Research Fellows Program
Calvin University Science Division
Grand River Rainscaping Partnership
MI Dept. of Environment, Great Lakes and Energy (EGLE)
Pierce Cedar Creek Institute
Plaster Creek Stewards
Michigan Space Grant Consortium (MSGC)
National Institutes of Health (NIH)
National Science Foundation (NSF)
S-STEM
Trees to Heal the Plaster Creek Watershed
USDA Forest Service Great Lakes Restoration Initiative
The Vermeer Grant

SPECIAL PRE-RELEASE SCREENING OF

LUMINOUS

A FILM BY SAM SMARTT
FEATURING LARRY MOLNAR

SATURDAY OCTOBER 23RD | 7:30PM

CFAC MAIN AUDITORIUM

FREE - NO TICKETS REQUIRED



WATCH THE
TRAILER

Please join us for a special pre-release screening of *Luminous*, a feature documentary by Calvin Film & Media professor Sam Smartt, which follows the exciting research of Calvin Physics and Astronomy professor Larry Molnar. In production since 2014, the film tells the story of Prof. Molnar's bold prediction of a luminous red nova in the constellation of Cygnus in 2022 and follows his five-year journey to test that prediction to see whether he is right. Altogether in the last seven years over twenty Calvin students from the Physics and Astronomy and Communication departments have assisted with the research and the filmmaking.