27th
ANNUAL

Undergraduate Research, Scholarship and Creative Activities Conference

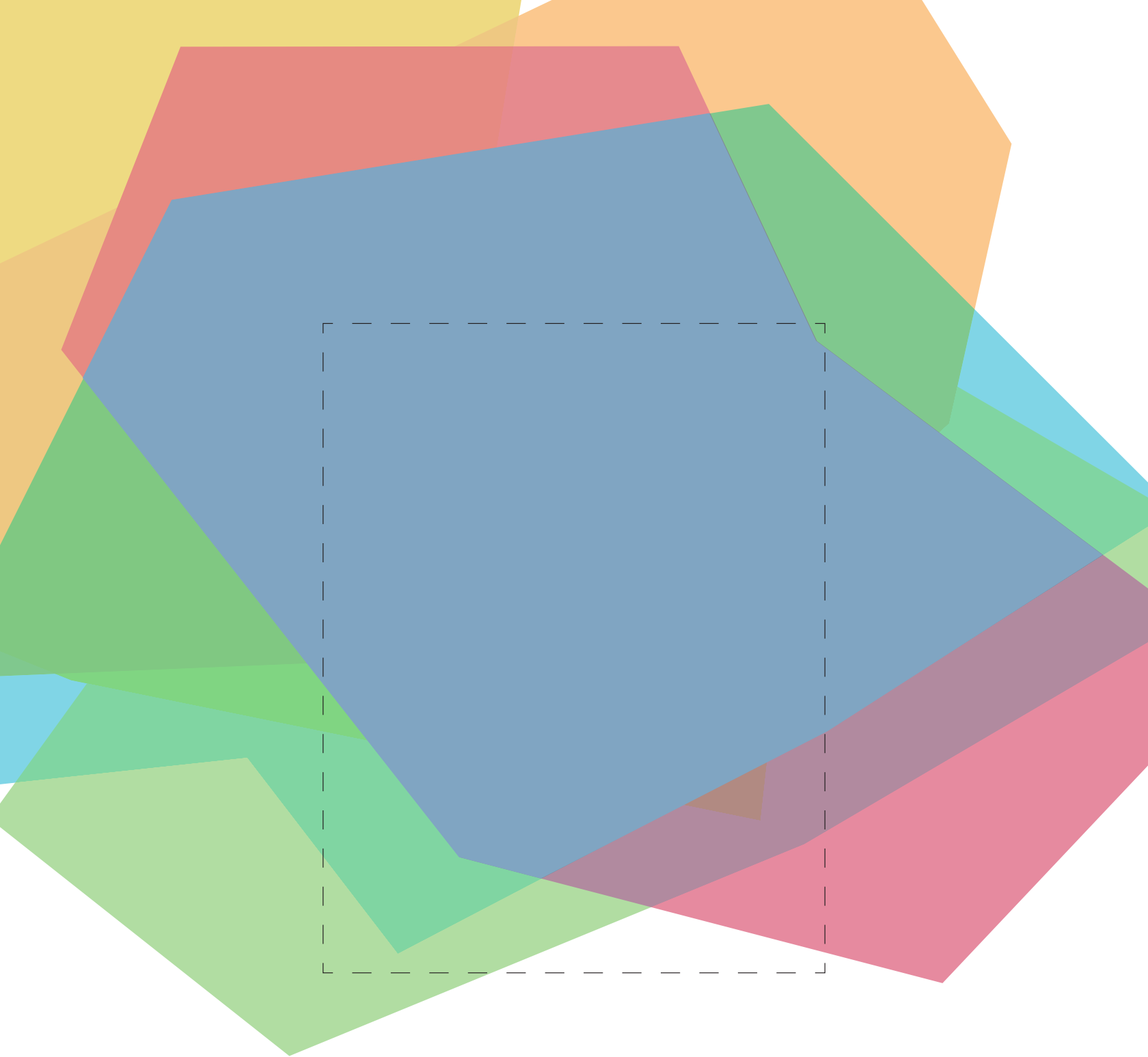
POSTER PRESENTATIONS
Friday, April 8, 2016
3–6 p.m.| ARC Pavilion

ARTS EXHIBIT
Friday, April 8, 2016
3–6 p.m. | ARC Pavilion

ORAL PRESENTATIONS
Saturday, April 9, 2016
1–6 p.m. | Wellman Hall

UCDAVIS

SPONSORED BY:
Undergraduate Education



MY ABSTRACT

27th Annual Undergraduate Research, Scholarship and Creative Activities Conference

Letter from the Chancellor

April 8, 2016

Dear Students, Colleagues, and Guests:

Welcome to UC Davis' annual exhibition of undergraduate research!

I am proud of the hundreds of students who will be presenting their work during this two-day conference. They truly are exceptional members of our student body. These dedicated young people have gone above and beyond the required undergraduate coursework to strengthen their understanding and knowledge of a specific subject. They have taken the plunge into the deep end of the academic pool and emerged with a greater appreciation for what it means to be an expert.

I cannot overemphasize the importance of hands-on research as part of the undergraduate experience. As an engineer who spent years working in research labs, I can tell you that the discipline, creativity and courage that brought these students here today will pay dividends in their future academic and professional careers.

Increasingly, employers are looking for people skilled in synthesis, collaboration and communications. The oral and poster presentations at this conference manifest all three skills.

The students combined different ideas to form a theory or system. They partnered with their peers and faculty mentors in problem-solving. And, today, they are taking the critical and courageous step of communicating the significance of their work to experts in the field as well friends and family. This last step can be the toughest and most important of all. The effectiveness of our contributions to society is almost wholly dependent on the skills with which we communicate them.

I want to offer my deepest appreciation to the faculty members who inspired and mentored these undergraduates in the rigors of scholarly research and the skills of effectively presenting their work. The many faculty volunteers who have taken time out of their busy schedules to moderate the sessions also deserve our gratitude.

My congratulations to the Undergraduate Research Center for its organization of the conference and its success in connecting students with research opportunities. Promoting collaboration between students and faculty in research is central to our mission at UC Davis.

I invite you to engage with the student presenters. Ask them about their work and themselves. How did they first become interested in the questions or issues presented in their posters? What most surprised or intrigued them about their findings?

You will be amazed and inspired by their responses!

Linda P.B. Katehi

Chancellor

27th Annual Undergraduate Research, Scholarship and Creative Activities Conference

Provost and Executive Vice Chancellor's Welcome

April 8, 2015

Dear Colleagues, Presenters, and Guests,

I wish to recognize all of the students participating in this year's Undergraduate Research, Scholarship, and Creative Activities Conference for the talent, hard work, and dedication that have brought them here today. The work they are sharing reflects not only their commitment to excellence in research, but also their painstaking preparation of formal presentations. This annual forum for the sharing of research is a crucible for many of them, and I commend them for their courage in participating. they have much to be proud of, as do their parents and friends. These exceptional young scholars represent some of the brightest and hardest-working students on our campus, and I have no doubt that all in attendance will be extremely impressed by what they see during this two-day event.

I am pleased to see that this year's presenters, like those of last year, come from a wide variety of fields, including the arts, humanities, and social sciences. People often think of "research" as something belonging exclusively to "STEM"—that is, physical science, technology, engineering, and mathematics, but at UC Davis, all of our faculty, in every field, engage in original research to advance the boundaries of knowledge.

Investigations by our faculty in the Arts, Humanities and social sciences—from comparative literature to psychology, from music to anthropology—provide invaluable insight into who we are, how we live, how we might live best, and where we are going. In providing this insight, they help us to locate the individual, and the many groups to which we all belong, within the diverse social and cultural structures of our time (including the structures that have come down to us, in evolved form, from earlier periods). These investigations also increase our awareness of, and ability to think productively about, such fundamental topics as fairness and justice; social, cultural, gender, and many other types of difference; what is required for a functional society, and a functional democracy; and what it means to be human and also humane. Research in the arts, humanities, and social sciences is thus an indispensable complement to our worthy and world-transforming work in STEM, as well as a cornerstone, compass, and frequent collaborator for every other sort of intellectual or creative endeavor across our campus.

As a scholar of classical literature who often focuses on reception studies, I aim in my own research to show the evolving relevance of ancient and medieval Greek and Roman literature to societies of later centuries, as well as to some of today's most compelling and profound questions. And like all scholars in the arts, humanities, and social sciences, I learn from and depend upon the contributions from all quarters of our humanistically oriented intellectual community.

As both a literature scholar and UC Davis's provost, I am proud that our students in the arts, humanities, and social sciences have many opportunities to experience the excitement of research firsthand, through mechanisms such as the senior thesis and independent study. There are future benefits, as well. Undergraduate research experience in these fields can give a student a leg up in applying to, and excelling in, a career or post-baccalaureate education. This experience can also, in itself, enable real-world impact. I think of students like

27th Annual Undergraduate Research, Scholarship and Creative Activities Conference

Provost and Executive Vice Chancellor's Welcome

Carolina Tavarez, who, after earning a B.A. in Spanish at UC Davis, parlayed her experiences as a McNair Scholar and winner of a Provost's Undergraduate Fellowship Award to develop a nonprofit organization for multilingual education in Haiti. Indeed, research experience in the human-centered fields can give one specific knowledge that is directly relevant to a wide range of careers, as well as general abilities in critical thinking and communication that are assets for any career.

Let me add that all of us at UC Davis are very excited about the upcoming opening of the Jan Shrem and Maria Manetti Shrem Museum of Art. When completed, this spectacular facility—which will facilitate enjoyment of the university's impressive arts collections as well as support education and research activities—will be a vibrant new center of arts activity on our campus. Currently, the Manetti Shrem Museum is reaching out to the extended UC Davis community to invite collaboration in building a many-faceted program that will best serve the campus and public, Representatives from the Museum will be tabling at the poster sessions. I invite everyone to stop by and find out more about this major new addition to our university, and learn how they can help to shape its future.

I thank all presenters and attendees for participating in the 2016 Undergraduate Research, Scholarship, and Creative Activities Conference. I know this will be an exceptionally rewarding experience for all.

Sincerely,

Ralph J. Hexter

Provost and Executive Vice Chancellor

TABLE OF CONTENTS

ACKNOWLEDGMENTS

The Undergraduate Research, Scholarship & Creative Activities Conference gratefully acknowledges the faculty sponsors and other individuals whose mentoring has contributed to the research produced by our presenters. We would also like to thank the many programs that generously support and encourage undergraduate research. Among these are the following: Beckman Scholars Program; California Alliance for Minority Participation (CAMP); Educational Enrichment Outreach Programs (BUSP, BUSP-Honors, BSHARP-MARC, CURE, ADAR); Internship and Career Center; McNair Scholars Program; Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS); Mentorships for Undergraduate Research Participants in the Physical and Mathematical Sciences (MURPPS); Provost's Undergraduate Fellowship; Undergraduate Research Center; University Honors Program; UC Davis Washington Program; and UC Leadership Excellence Through Advanced Degrees (UC LEADS).

Sponsors

Campus Community Relations
College of Agricultural & Environmental Sciences
College of Biological Sciences
College of Engineering
College of Letters & Science
Institute for Social Sciences
Jan Shrem and Maria Manetti Shrem Museum of Art
Undergraduate Education
Undergraduate Research Center

Undergraduate Research, Scholarship and Creative Activities Conference Committee

Lolita Adkins – Undergraduate Research Center; CAMP, MURPPS
Jacques Bowyer – McNair Scholars Program; Graduate Studies
Lili Bynes – Dean's Office, College of Agricultural & Environmental Sciences
Connie Champagne – College of Biological Sciences; BUSP
Janet Gutierrez – Dean's Office, College of Letters & Science
Tom Hall – Dean's Office, College of Biological Sciences
Raynell Hamilton – Student Academic Success Center; MURALS
Tammy Hoyer – Conference Chair, Undergraduate Research Center
Alessa Johns – Undergraduate Council–Committee on Special Academic Programs
Anna Lam – Undergraduate Student Representative
Angelique Louie – Undergraduate Research Center
Janice Morand – Internship and Career Center
Kim Reinking – Dean's Office, College of Engineering

Design and Publications

Student Affairs Marketing and Communications

AGENDA

Poster Sessions: Friday, April 8, 2016

3–6 p.m., ARC Pavilion

3–4 p.m. ..... Poster Session A
ARC Pavilion

4–5 p.m. ..... Poster Session B
ARC Pavilion

5–6 p.m. ..... Poster Session C
ARC Pavilion

Arts Exhibit: Friday, April 8, 2016

(concurrent with poster session)
3–6 p.m., ARC Pavilion

3–6 p.m. ..... Arts Exhibit
ARC Pavilion

Oral Sessions: Saturday, April 9, 2016

1–6 p.m., Wellman Hall

Noon–1 p.m. ..... Presenter Check-in
Wellman Hall

1–2:30 p.m. ..... Oral Session 1
Wellman Hall Rooms

3–4:30 p.m. ..... Oral Session 2
Wellman Hall Rooms

5–6 p.m. ..... Oral Session 3
Wellman Hall Rooms

PRESENTERS

Acord, Katherine	Session 1	Oral	1:00 p.m.	233 Wellman
Adams, Joseph	Session 1	Oral	2:15 p.m.	106 Wellman
Ahmad, Imran	Session 2	Oral	3:00 p.m.	216 Wellman
Ahn, Jamie	Session A	Poster 63	3:00 p.m.	Pavilion
Akre, Samir	Session C	Poster 65	5:00 p.m.	Pavilion
Al-Saleh, Lujain	Session 2	Oral	3:15 p.m.	216 Wellman
Ali, Ruthe	Session C	Poster 96	5:00 p.m.	Pavilion
Aliakbar, Raya	Session C	Poster 106	5:00 p.m.	Pavilion
Alkaslasi, Mor	Session C	Poster 19	5:00 p.m.	Pavilion
Allshouse, Aurora	Session B	Poster 4	4:00 p.m.	Pavilion
Almaraz, Jessica	Session B	Poster 5	4:00 p.m.	Pavilion
Altamirano, Jelleny	Session B	Poster 116	4:00 p.m.	Pavilion
Alvarado, Jocelyn	Session C	Poster 70	5:00 p.m.	Pavilion
Amouzgar, Meelad	Session B	Poster 58	4:00 p.m.	Pavilion
Anderson, Jordan	Session A	Poster 54	3:00 p.m.	Pavilion
Andrawis, (Alex) Sandra	Session B	Poster 112	4:00 p.m.	Pavilion
Arevalo, Aileen	Session C	Poster 93	5:00 p.m.	Pavilion
Au, Nancy	Session A	Poster 48	3:00 p.m.	Pavilion
Avey, Alec	Session A	Poster 67	3:00 p.m.	Pavilion
Babakhanians, Fiona	Session B	Poster 26	4:00 p.m.	Pavilion
Bailey, Logan	Session B	Poster 66	4:00 p.m.	Pavilion
Bailey, Melissa	Session A	Poster 98	3:00 p.m.	Pavilion
Baker, Christa	Session C	Poster 3	5:00 p.m.	Pavilion
Baker, Rebecca	Session C	Poster 98	5:00 p.m.	Pavilion
Baldwin, Laura	Session A	Poster 108	3:00 p.m.	Pavilion
Balland, Jessica	Session C	Poster 20	5:00 p.m.	Pavilion
Bapat, Priyanka	Session A	Poster 23	3:00 p.m.	Pavilion
Barab, Hailey	Session 1	Oral	1:00 p.m.	106 Wellman
Bartel, Juliana	Session B	Poster 10	4:00 p.m.	Pavilion
Barth, Madeleine	Session A	Poster 66	3:00 p.m.	Pavilion
Bassal, Angela	Session B	Poster 34	4:00 p.m.	Pavilion
Bassil, Reina Angelica	Session B	Poster 73	4:00 p.m.	Pavilion
Bell, Laura	Session 1	Oral	1:00 p.m.	212 Wellman
Bellamkonda, Nikhil	Session A	Poster 53	3:00 p.m.	Pavilion
Beltrán, Karina	Session A	Poster 46	3:00 p.m.	Pavilion
Benipal, Simranjeet	Session B	Poster 72	4:00 p.m.	Pavilion
Berg, Kimberley	Session 1	Oral	1:00 p.m.	2 Wellman
Bhattarai, Shrishti	Session A	Poster 55	3:00 p.m.	Pavilion
Blanc, Jennifer	Session C	Poster 62	5:00 p.m.	Pavilion
Bondi, Taylor	Session C	Poster 25	5:00 p.m.	Pavilion
Bonham, Katie	Session B	Poster 7	4:00 p.m.	Pavilion
Bonham, Stephanie	Session 2	Oral	4:15 p.m.	205 Wellman
Booker, Jacqueline	Session A	Poster 101	3:00 p.m.	Pavilion
Bourne, Traci	Session A	Poster 83	3:00 p.m.	Pavilion
Boyd, Ajeelon	Session A	Poster 34	3:00 p.m.	Pavilion
Brande, Kaili	Session A	Poster 38	3:00 p.m.	Pavilion
Brown, Andre	Session C	Poster 53	5:00 p.m.	Pavilion
Brown, Laura		Art Exhibit	3:00 p.m.	Pavilion
Bruce, Robert	Session B	Poster 94	4:00 p.m.	Pavilion
Bui, Christina	Session A	Poster 91	3:00 p.m.	Pavilion
Cabral, Noelle	Session B	Poster 52	4:00 p.m.	Pavilion
Caligiuri, Alexis	Session 2	Oral	4:15 p.m.	26 Wellman
Calip, Tiani	Session 2	Oral	3:00 p.m.	212 Wellman
Camilli, Kayla	Session 2	Oral	4:15 p.m.	207 Wellman
Carvajal, Cindy	Session A	Poster 85	3:00 p.m.	Pavilion
Casas, Christian	Session B	Poster 61	4:00 p.m.	Pavilion
Castallano-Ladd, David	Session C	Poster 5	5:00 p.m.	Pavilion
Cedillo, Lucydalila	Session B	Poster 97	4:00 p.m.	Pavilion
Ceja, Cristina	Session A	Poster 49	3:00 p.m.	Pavilion
Chadha, Deeptansh	Session A	Poster 41	3:00 p.m.	Pavilion
Chakraborty, Vishal	Session 1	Oral	1:30 p.m.	106 Wellman
Chan, Alan	Session B	Poster 99	4:00 p.m.	Pavilion
Chan, Elizabeth	Session A	Poster 99	3:00 p.m.	Pavilion
Chan, Grace	Session A	Poster 25	3:00 p.m.	Pavilion
Chan, Melissa	Session B	Poster 42	4:00 p.m.	Pavilion
Chang, Alene	Session B	Poster 45	4:00 p.m.	Pavilion
Chang, Christina	Session A	Poster 62	3:00 p.m.	Pavilion
Chang, Jonghoon	Session 2	Oral	3:00 p.m.	106 Wellman
Chang, Michelle	Session B	Poster 82	4:00 p.m.	Pavilion
Chaudhary, Rosy	Session C	Poster 79	5:00 p.m.	Pavilion
Chavez, Alexis	Session 2	Oral	3:30 p.m.	216 Wellman
Chavez, Michael	Session 1	Oral	1:00 p.m.	226 Wellman
Chavez-Verduzco, Jose		Art Exhibit	3:00 p.m.	Pavilion
Cheah, Jenice	Session 1	Oral	1:00 p.m.	202 Wellman
Chen, Connie	Session A	Poster 86	3:00 p.m.	Pavilion
Chen, Huanchun	Session B	Poster 109	4:00 p.m.	Pavilion
Chen, Jiahui	Session A	Poster 87	3:00 p.m.	Pavilion
Chen, Maggie	Session B	Poster 47	4:00 p.m.	Pavilion
Chen, Mengyu	Session 2	Oral	3:30 p.m.	205 Wellman
Chen, Michelle	Session A	Poster 61	3:00 p.m.	Pavilion
Chere, Brittney	Session C	Poster 21	5:00 p.m.	Pavilion
Cheung, Andrea	Session A	Poster 107	3:00 p.m.	Pavilion
Cheung, Malinda	Session C	Poster 114	5:00 p.m.	Pavilion
Chiang, Alexander	Session A	Poster 73	3:00 p.m.	Pavilion
Choi, Shannon	Session B	Poster 93	4:00 p.m.	Pavilion
Chow, Fanny	Session 2	Oral	3:00 p.m.	26 Wellman
Chow, Sarah	Session C	Poster 104	5:00 p.m.	Pavilion
Chu, Roy	Session 1	Oral	1:00 p.m.	229 Wellman
Chuen, Andrew	Session A	Poster 14	3:00 p.m.	Pavilion
Clark, Brigitte	Session C	Poster 43	5:00 p.m.	Pavilion

Collins, Sequoya	Session 1	Oral	1:45 p.m.	106 Wellman
Condor, Jose	Session C	Poster 90	5:00 p.m.	Pavilion
Contreras Ramirez, Marcos	Session 2	Oral	3:00 p.m.	119 Wellman
Coon, Sarah	Session C	Poster 10	5:00 p.m.	Pavilion
Copeland, Tiffany	Session C	Poster 33	5:00 p.m.	Pavilion
Cosme, Chryslea	Session B	Poster 90	4:00 p.m.	Pavilion
Croze, Ben	Session B	Poster 111	4:00 p.m.	Pavilion
Cruz, Amanda	Session 1	Oral	1:00 p.m.	216 Wellman
Cruz, Andrea	Session C	Poster 47	5:00 p.m.	Pavilion
Cunningham, Brittany	Session 1	Oral	1:15 p.m.	202 Wellman
Cynar, Haley	Session A	Poster 1	3:00 p.m.	Pavilion
Dahms, Petra	Session A	Poster 114	3:00 p.m.	Pavilion
Dang, James	Session B	Poster 37	4:00 p.m.	Pavilion
Danielson, Daine	Session 2	Oral	3:15 p.m.	26 Wellman
Davila, Randy	Session C	Poster 32	5:00 p.m.	Pavilion
Davis, Alycia	Session B	Poster 3	4:00 p.m.	Pavilion
De Vries, Dana	Session A	Poster 76	3:00 p.m.	Pavilion
Deng, Yue	Session 1	Oral	1:15 p.m.	233 Wellman
Derpinghaus, Amber	Session A	Poster 117	3:00 p.m.	Pavilion
Devlin, Bridget	Session 1	Oral	1:15 p.m.	226 Wellman
Dhauna, Janeet	Session C	Poster 20	5:00 p.m.	Pavilion
Diep, Timothy	Session C	Poster 38	5:00 p.m.	Pavilion
Dileep, Gayathri	Session 1	Oral	1:15 p.m.	229 Wellman
Dillman, Hannah	Session 2	Oral	4:00 p.m.	205 Wellman
Dinis, Jacob	Session A	Poster 92	3:00 p.m.	Pavilion
Dittrich, Melissa	Session 1	Oral	1:00 p.m.	126 Wellman
Diveley, Juliette	Session 1	Oral	2:15 p.m.	212 Wellman
Dixit, Leela	Session 2	Oral	3:00 p.m.	2 Wellman
Do, Leslie	Session 2	Oral	4:15 p.m.	216 Wellman
Doan, Jonathan	Session C	Poster 61	5:00 p.m.	Pavilion
Dou, Yimeng	Session A	Poster 81	3:00 p.m.	Pavilion
Du, Amy	Session 1	Oral	1:30 p.m.	202 Wellman
Duckworth, Lauren	Session B	Poster 1	4:00 p.m.	Pavilion
Dunham, Samantha	Session B	Poster 1	4:00 p.m.	Pavilion
Dutta, Kavita	Session 1	Oral	1:15 p.m.	2 Wellman
Dwivedi, Ila	Session B	Poster 30	4:00 p.m.	Pavilion
Ebuehi, Esther	Session C	Poster 16	5:00 p.m.	Pavilion
Edquilang, Jesus	Session B	Poster 64	4:00 p.m.	Pavilion
Ehrlich, Sean	Session 1	Oral	1:00 p.m.	26 Wellman
Eke, Amanda	Session 1	Oral	1:00 p.m.	119 Wellman
Ekman, Lauren	Session 2	Oral	3:00 p.m.	6 Wellman
Elliott, Matthew	Session A	Poster 50	3:00 p.m.	Pavilion
Elmojahid, Sam	Session A	Poster 82	3:00 p.m.	Pavilion
Erandio, Jesse	Session C	Poster 86	5:00 p.m.	Pavilion
Esparza, Elsa	Session A	Poster 32	3:00 p.m.	Pavilion
Etemad, Neusha	Session 1	Oral	1:15 p.m.	26 Wellman
Evoy, Angela	Session B	Poster 8	4:00 p.m.	Pavilion
Ewald, Makena	Session 1	Oral	1:45 p.m.	230 Wellman
Fabian Bronson, Danielle	Session 2	Oral	3:45 p.m.	126 Wellman
Fallan, Kenna	Session B	Poster 111	4:00 p.m.	Pavilion
Faria, Alexis	Session A	Poster 20	3:00 p.m.	Pavilion
Fayyaz, Azka	Session 1	Oral	1:00 p.m.	205 Wellman
Fazel, Farhad	Session C	Poster 84	5:00 p.m.	Pavilion
Ferguson, Colin	Session A	Poster 3	3:00 p.m.	Pavilion
Fethat, Katayun	Session A	Poster 16	3:00 p.m.	Pavilion
Figueroa, Alicia	Session A	Poster 2	3:00 p.m.	Pavilion
Flaws, Caitlin	Session 1	Oral	1:00 p.m.	6 Wellman
Flores, Michael	Session C	Poster 51	5:00 p.m.	Pavilion
Flores, Rosalva	Session 2	Oral	3:15 p.m.	106 Wellman
Floyd, Clair	Session A	Poster 10	3:00 p.m.	Pavilion
Foote, Meghan	Session A	Poster 118	3:00 p.m.	Pavilion
Foreman, Kaitlyn	Session C	Poster 28	5:00 p.m.	Pavilion
Fowler, Natasha	Session A	Poster 33	3:00 p.m.	Pavilion
France, Lara	Session 2	Oral	3:15 p.m.	202 Wellman
Franco, Konrad	Session 2	Oral	3:00 p.m.	205 Wellman
Furtado, Kathleen	Session 2	Oral	4:00 p.m.	2 Wellman
Fyhrie, Matthew	Session B	Poster 105	4:00 p.m.	Pavilion
Gabbert, Allison	Session C	Poster 67	5:00 p.m.	Pavilion
Gainer, Marcus	Session 2	Oral	3:00 p.m.	226 Wellman
Galvez Hernandez, Jose	Session 1	Oral	1:15 p.m.	212 Wellman
Gandy, Lydia	Session B	Poster 32	4:00 p.m.	Pavilion
Garcia, Carol	Session 1	Oral	1:15 p.m.	205 Wellman
Garcia, Joshua	Session A	Poster 42	3:00 p.m.	Pavilion
Garcia-Ruiz, Susana	Session A	Poster 45	3:00 p.m.	Pavilion
Garrett, Titus	Session A	Poster 12	3:00 p.m.	Pavilion
Gee, Jessica	Session B	Poster 22	4:00 p.m.	Pavilion
Ghaffari-Rafi, Shadeh	Session 2	Oral	3:15 p.m.	6 Wellman
Giafaglione, Jenna	Session A	Poster 95	3:00 p.m.	Pavilion
Gilbert, Jada	Session 2	Oral	3:30 p.m.	202 Wellman
Gilliam, Christopher	Session B	Poster 41	4:00 p.m.	Pavilion
Glorioso, Christopher	Session B	Poster 62	4:00 p.m.	Pavilion
Godbout, Alexander	Session 2	Oral	4:00 p.m.	106 Wellman
Gold, Jennifer	Session A	Poster 65	3:00 p.m.	Pavilion
Goldberg, Robyn	Session B	Poster 11	4:00 p.m.	Pavilion
Goley, Stephanie	Session A	Poster 35	3:00 p.m.	Pavilion
Gonzalez, Ace	Session 1	Oral	1:30 p.m.	229 Wellman
Gonzalez, Eduardo	Session 1	Oral	2:00 p.m.	202 Wellman
Gonzalez Garcia, Jorge	Session C	Poster 120	5:00 p.m.	Pavilion
Gordon, Grace	Session 2	Oral	3:00 p.m.	207 Wellman
Gouw, Aaron	Session B	Poster 36	4:00 p.m.	Pavilion

Gromova, Tatiana ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 226 Wellman
Gu, Tansy ..... Session A ..... Poster 97 ..... 3:00 p.m. ..... Pavilion
Guerrero, Leandro ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 226 Wellman
Guillermo, Michael ..... Session B ..... Poster 101 ..... 4:00 p.m. ..... Pavilion
Gutierrez, Pedro ..... Session A ... Poster 100 ..... 3:00 p.m. ..... Pavilion
Guzman Alvarez, Stephanie ..... Session C ..... Poster 29 ..... 5:00 p.m. ..... Pavilion
Ha, Quang Minh ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 229 Wellman
Haddad, Daniel ..... Session C ..... Poster 7 ..... 5:00 p.m. ..... Pavilion
Hameed, Mariam ..... Session C ..... Poster 17 ..... 5:00 p.m. ..... Pavilion
Hanak, Amy ..... Session C .... Poster 118 ..... 5:00 p.m. ..... Pavilion
Hart, Ronald ..... Session C ..... Poster 91 ..... 5:00 p.m. ..... Pavilion
Hasen-Klein, Deborah ..... Session B ..... Poster 16 ..... 4:00 p.m. ..... Pavilion
Haugland, Megan ..... Session B ..... Poster 77 ..... 4:00 p.m. ..... Pavilion
Haupt, Kaitlin ..... Session B ..... Poster 25 ..... 4:00 p.m. ..... Pavilion
Heifler, Sydney ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 6 Wellman
Heino, Hayley ..... Session C ..... Poster 12 ..... 5:00 p.m. ..... Pavilion
Henry, Mariana ..... Session C ..... Poster 18 ..... 5:00 p.m. ..... Pavilion
Hernandez, Angelica ..... Session B ..... Poster 20 ..... 4:00 p.m. ..... Pavilion
Herrera, Jennifer ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 126 Wellman
Hill, Katherine ..... Session B ..... Poster 27 ..... 4:00 p.m. ..... Pavilion
Hill, Kevin ..... Session B ..... Poster 14 ..... 4:00 p.m. ..... Pavilion
Hisham, Nur Syazana Natasha ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 26 Wellman
Howard, Jessica ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 26 Wellman
Huang, Lixian ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 233 Wellman
Huang, Nanxi ..... Session B ..... Poster 83 ..... 4:00 p.m. ..... Pavilion
Hull, Bryna ..... Session B ..... Poster 9 ..... 4:00 p.m. ..... Pavilion
Hung, Benjamin ..... Session C ..... Poster 75 ..... 5:00 p.m. ..... Pavilion
Hunter, Dezmon ..... Session C ..... Poster 8 ..... 5:00 p.m. ..... Pavilion
Huynh, Jill ..... Session C ..... Poster 45 ..... 5:00 p.m. ..... Pavilion
Ibrahim-Biangoro, Abou ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 2 Wellman
Ilanthiraian, Stegi ..... Session B ..... Poster 69 ..... 4:00 p.m. ..... Pavilion
Iliuta, Elizabeth ..... Session C ..... Poster 67 ..... 5:00 p.m. ..... Pavilion
Imbiakha, Brian ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 216 Wellman
Innes-Gawn, Tuleagh ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 202 Wellman
Ivanova, Xenia ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 212 Wellman
Iyer, Radhika ..... Session A ..... Poster 24 ..... 3:00 p.m. ..... Pavilion
Jahanghir, Rehaan ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 26 Wellman
Jaiswal, Shreya ..... Session A ..... Poster 59 ..... 3:00 p.m. ..... Pavilion
Jaladanki, Neeharika ..... Session C ..... Poster 27 ..... 5:00 p.m. ..... Pavilion
Jaradeh, Mark ..... Session C ... Poster 100 ..... 5:00 p.m. ..... Pavilion
Jaramishian, Claire ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 107 Wellman
Jayne, Nathan ..... Session A ... Poster 104 ..... 3:00 p.m. ..... Pavilion
Jennings, Alexandra ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 107 Wellman
Jereb, Catherine ..... Session B ..... Poster 43 ..... 4:00 p.m. ..... Pavilion
John, Gavin ..... Session B ..... Poster 74 ..... 4:00 p.m. ..... Pavilion
Johnson, Alexa ..... Session A .... Poster 119 ..... 3:00 p.m. ..... Pavilion
Johnston, Anna ..... Session A ..... Poster 8 ..... 3:00 p.m. ..... Pavilion
Jones, Allison ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 119 Wellman
Jones, Jessica ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 119 Wellman
Joseph, Najah ..... Session B ..... Poster 55 ..... 4:00 p.m. ..... Pavilion
Kain, Jennifer ..... Session A ..... Poster 17 ..... 3:00 p.m. ..... Pavilion
Kan, Wesley ..... Session C ..... Poster 63 ..... 5:00 p.m. ..... Pavilion
Kang, Heeteak ..... Session C ..... Poster 2 ..... 5:00 p.m. ..... Pavilion
Kang, Jiye ..... Session C ..... Poster 2 ..... 5:00 p.m. ..... Pavilion
Kao, Laura ..... Session A ..... Poster 28 ..... 3:00 p.m. ..... Pavilion
Kapoor, Avantika ..... Session B ..... Poster 28 ..... 4:00 p.m. ..... Pavilion
Kaur, Manvir ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 2 Wellman
Kaur, Rupleen ..... Session B ..... Poster 53 ..... 4:00 p.m. ..... Pavilion
Kaur, Sabreena ..... Session C ..... Poster 71 ..... 5:00 p.m. ..... Pavilion
Kennedy, Matthew ..... Session C ..... Poster 74 ..... 5:00 p.m. ..... Pavilion
Kennedy-McDonnell, Erik .... Session 2 ..... Oral ..... 3:45 p.m. ..... 216 Wellman
Keum, Chayoung ..... Session C ..... Poster 48 ..... 5:00 p.m. ..... Pavilion
Kim, Elizabeth ..... Session A ..... Poster 43 ..... 3:00 p.m. ..... Pavilion
Kim, Ji Won ..... Session C ..... Poster 73 ..... 5:00 p.m. ..... Pavilion
Kim, Stephanie ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 106 Wellman
Kingi, Doniko ..... Session B ... Poster 103 ..... 4:00 p.m. ..... Pavilion
Klich, Melanie ..... Session C ... Poster 105 ..... 5:00 p.m. ..... Pavilion
Klyver, John ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 229 Wellman
Ko, Ryan ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 229 Wellman
Koehler, Samuel ..... Session B ..... Poster 78 ..... 4:00 p.m. ..... Pavilion
Koenigsaecker, Tynisha ..... Session A .... Poster 115 ..... 3:00 p.m. ..... Pavilion
Kolahi Sohrabi, Arian ..... Session B ..... Poster 35 ..... 4:00 p.m. ..... Pavilion
Komarla, Anvita ..... Session C ..... Poster 72 ..... 5:00 p.m. ..... Pavilion
Kommoju, Nimitha ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 119 Wellman
Komutrattananon, Rinrada .. Session C ..... Poster 46 ..... 5:00 p.m. ..... Pavilion
Koo, Jennifer ..... Session B ..... Poster 63 ..... 4:00 p.m. ..... Pavilion
Kopparapu, Srujan ..... Session B ..... Poster 71 ..... 4:00 p.m. ..... Pavilion
Kotovets, Lawrence ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 207 Wellman
Kramer, Cassandra ..... Session B ..... Poster 59 ..... 4:00 p.m. ..... Pavilion
Kuffel, Randall ..... Session 2 ..... Oral ..... 3:00 p.m. ..... 229 Wellman
Kulinich, Andrea ..... Session B ..... Poster 44 ..... 4:00 p.m. ..... Pavilion
Kumari, Sonam ..... Session B ..... Poster 34 ..... 4:00 p.m. ..... Pavilion
Kurland, Willa ..... Session B ..... Poster 50 ..... 4:00 p.m. ..... Pavilion
Kwa, Nickey ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 226 Wellman
Kwong, Ada ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 233 Wellman
Lam, Chelsea ..... Session B ..... Poster 92 ..... 4:00 p.m. ..... Pavilion
Lammers, Cara ..... Session C ..... Poster 22 ..... 5:00 p.m. ..... Pavilion
Larke, Jules ..... Session A ..... Poster 90 ..... 3:00 p.m. ..... Pavilion
Larson, Daniel ..... Session A ..... Poster 4 ..... 3:00 p.m. ..... Pavilion
Laurie, Matthew ..... Session C ..... Poster 7 ..... 5:00 p.m. ..... Pavilion

Le, Cong-huy ..... Session A ..... Poster 52 ..... 3:00 p.m. ..... Pavilion
Leano, Amiel ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 26 Wellman
Lee, Allison ..... Session B ..... Poster 33 ..... 4:00 p.m. ..... Pavilion
Lee, Mary ..... Session C ..... Poster 78 ..... 5:00 p.m. ..... Pavilion
Lee, Panhoia ..... Session B ..... Poster 18 ..... 4:00 p.m. ..... Pavilion
Lee, Samantha ..... Session C ..... Poster 14 ..... 5:00 p.m. ..... Pavilion
Lee, Yongam ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 106 Wellman
Leong, Amy ..... Art Exhibit ..... 3:00 p.m. ..... Pavilion
Leung, Kevin ..... Session C ... Poster 103 ..... 5:00 p.m. ..... Pavilion
Leung, Preston ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 226 Wellman
Levin, Rachel ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 6 Wellman
Lew, Stephanie ..... Session C ..... Poster 87 ..... 5:00 p.m. ..... Pavilion
Lewis, Nichole ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 107 Wellman
Liang, Jennifer ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 202 Wellman
Lieu, Alexander ..... Session B ..... Poster 84 ..... 4:00 p.m. ..... Pavilion
Lim, Austin ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 207 Wellman
Lin, Jason ..... Art Exhibit ..... 3:00 p.m. ..... Pavilion
Lin, Nicole ..... Session B ..... Poster 89 ..... 4:00 p.m. ..... Pavilion
Lingel-Gary, Emma ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 126 Wellman
Liu, Chang ..... Session B ..... Poster 2 ..... 4:00 p.m. ..... Pavilion
Liu, Chung Heng (Peter) ..... Session C ..... Poster 95 ..... 5:00 p.m. ..... Pavilion
Livingstone, Michelle ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 205 Wellman
Lo, Allison ..... Session B ... Poster 106 ..... 4:00 p.m. ..... Pavilion
Loey, Jamie ..... Session C ..... Poster 9 ..... 5:00 p.m. ..... Pavilion
Long, Matthew ..... Session C ..... Poster 66 ..... 5:00 p.m. ..... Pavilion
Longenbaugh, Tyler ..... Session C ..... Poster 36 ..... 5:00 p.m. ..... Pavilion
Lopez, Lia ..... Session B ..... Poster 75 ..... 4:00 p.m. ..... Pavilion
Lopez Bastidas, Lani ..... Session B .... Poster 117 ..... 4:00 p.m. ..... Pavilion
Louis, Shreya ..... Session C ..... Poster 42 ..... 5:00 p.m. ..... Pavilion
Lu, Joanne ..... Session B ..... Poster 19 ..... 4:00 p.m. ..... Pavilion
Lubow, Louis ..... Session C ..... Poster 11 ..... 5:00 p.m. ..... Pavilion
Lui, Austin ..... Session A ..... Poster 56 ..... 3:00 p.m. ..... Pavilion
Lujan, Karley ..... Session A .... Poster 113 ..... 3:00 p.m. ..... Pavilion
Ma, Christopher ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 107 Wellman
Ma, Htet ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 212 Wellman
Ma, Yue ..... Session A ..... Poster 30 ..... 3:00 p.m. ..... Pavilion
Machado, Antoinette ..... Session B ..... Poster 79 ..... 4:00 p.m. ..... Pavilion
Maciel, Ana ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 119 Wellman
Mack, Maura ..... Session A .... Poster 116 ..... 3:00 p.m. ..... Pavilion
Magallanes, Elisa ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 205 Wellman
Mahalawat, Meghan ..... Session B ..... Poster 67 ..... 4:00 p.m. ..... Pavilion
Mains, Kathryn ..... Session C .... Poster 110 ..... 5:00 p.m. ..... Pavilion
Maniscalco, Sydney ..... Session C ..... Poster 24 ..... 5:00 p.m. ..... Pavilion
Marin, Harold ..... Session C ..... Poster 69 ..... 5:00 p.m. ..... Pavilion
Marks-Hicks, Alexis ..... Session C ..... Poster 89 ..... 5:00 p.m. ..... Pavilion
Marshall, Rebecca ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 119 Wellman
Martin, Shane ..... Session B ..... Poster 6 ..... 4:00 p.m. ..... Pavilion
Martin-Gascon, Beatriz ..... Session B .... Poster 118 ..... 4:00 p.m. ..... Pavilion
Martinez, Deniss ..... Session B ..... Poster 15 ..... 4:00 p.m. ..... Pavilion
Martinez, Marisa ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 107 Wellman
Mata, Rebecca ..... Session C ..... Poster 34 ..... 5:00 p.m. ..... Pavilion
Matsumoto, Collin ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 216 Wellman
Matuszak, Daniel ..... Session A ... Poster 106 ..... 3:00 p.m. ..... Pavilion
Mayo, Catherine ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 226 Wellman
McMillen, Shasta ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 6 Wellman
McNeill, Patricia ..... Session B ..... Poster 2 ..... 4:00 p.m. ..... Pavilion
Mei, Jeanette ..... Session B ..... Poster 56 ..... 4:00 p.m. ..... Pavilion
Mejia, Camille ..... Session A ..... Poster 51 ..... 3:00 p.m. ..... Pavilion
Mengesha, Zion ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 119 Wellman
Merritt, Karissa ..... Session C ..... Poster 57 ..... 5:00 p.m. ..... Pavilion
Miller, Kimberly ..... Session B ..... Poster 96 ..... 4:00 p.m. ..... Pavilion
Miller, Rebecca ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 212 Wellman
Ming-Whitfield, Brittni ..... Session 1 ..... Oral ..... 1:00 p.m. ..... 207 Wellman
Miramontes, Marisela ..... Session B ... Poster 108 ..... 4:00 p.m. ..... Pavilion
Mollhoff, Iris ..... Session C ..... Poster 80 ..... 5:00 p.m. ..... Pavilion
Moncada, Shaun ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 212 Wellman
Mondal, Debadrita ..... Session C ..... Poster 12 ..... 5:00 p.m. ..... Pavilion
Montague-Jackson, Simone Session 1 ..... Oral ..... 2:00 p.m. ..... 26 Wellman
Moran, Brendan ..... Session C ..... Poster 60 ..... 5:00 p.m. ..... Pavilion
Mosier, Cameron ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 119 Wellman
Mulcahy, Allyson ..... Session B ..... Poster 91 ..... 4:00 p.m. ..... Pavilion
Mume, Biftu ..... Session B ..... Poster 54 ..... 4:00 p.m. ..... Pavilion
Muo, Chinedum ..... Session B ..... Poster 24 ..... 4:00 p.m. ..... Pavilion
Murillo, Cynthia ..... Session B .... Poster 115 ..... 4:00 p.m. ..... Pavilion
Murugesan, Mohan Koumar Session 1 ..... Oral ..... 1:30 p.m. ..... 2 Wellman
Nahigian, Gardenia ..... Session C ..... Poster 94 ..... 5:00 p.m. ..... Pavilion
Naik, Sanjana ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 107 Wellman
Najarro, Melodie ..... Session B ..... Poster 75 ..... 4:00 p.m. ..... Pavilion
Nakayama, Taylor ..... Session A ..... Poster 89 ..... 3:00 p.m. ..... Pavilion
Navarro Nunez, Maria ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 212 Wellman
Neat, Abbey ..... Session A ..... Poster 37 ..... 3:00 p.m. ..... Pavilion
Neverova, Ekaterina ..... Session A ..... Poster 75 ..... 3:00 p.m. ..... Pavilion
Ng, Tammy ..... Session A ..... Poster 40 ..... 3:00 p.m. ..... Pavilion
Nguyen, Alan ..... Session C ..... Poster 50 ..... 5:00 p.m. ..... Pavilion
Nguyen, An ..... Session A ... Poster 109 ..... 3:00 p.m. ..... Pavilion
Nguyen, Anh ..... Session C ..... Poster 41 ..... 5:00 p.m. ..... Pavilion
Nguyen, Bao ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 226 Wellman
Nguyen, Don ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 216 Wellman
Nguyen, Henry ..... Session A ..... Poster 77 ..... 3:00 p.m. ..... Pavilion
Nguyen, Kateri ..... Session B ..... Poster 18 ..... 4:00 p.m. ..... Pavilion

Nguyen, Kenny ..... Session C ..... Poster 26 ..... 5:00 p.m. ..... Pavilion
Nguyen, Kristofer ..... Session A ... Poster 102 ..... 3:00 p.m. ..... Pavilion
Nguyen, Laura ..... Session C ..... Poster 54 ..... 5:00 p.m. ..... Pavilion
Nguyen, Lynh ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 106 Wellman
Nguyen, Veronica ..... Session C ..... Poster 76 ..... 5:00 p.m. ..... Pavilion
Nirmal, Niba ..... Session A ..... Poster 111 ..... 3:00 p.m. ..... Pavilion
Nishi, Audry ..... Session C .... Poster 112 ..... 5:00 p.m. ..... Pavilion
Nishida, Kristine ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 216 Wellman
Nola, Ashley ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 207 Wellman
Noorali, Shelina ..... Session A ..... Poster 39 ..... 3:00 p.m. ..... Pavilion
Noronha, Adriana ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 229 Wellman
Noronha, Juliana ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 229 Wellman
Nuryadi, Natasha Stacy ..... Session A ..... Poster 15 ..... 3:00 p.m. ..... Pavilion
Ogana, Heather Anne ..... Session C ..... Poster 68 ..... 5:00 p.m. ..... Pavilion
OKeefe, Christopher ..... Session B .... Poster 110 ..... 4:00 p.m. ..... Pavilion
Olsen, Eric ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 202 Wellman
Ong, Amanda ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 6 Wellman
Ortiz, Silvio ..... Session A ..... Poster 93 ..... 3:00 p.m. ..... Pavilion
Othman, Neda ..... Session B ..... Poster 98 ..... 4:00 p.m. ..... Pavilion
Paivinen, Anna ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 207 Wellman
Pal, Srijita ..... Session C .... Poster 119 ..... 5:00 p.m. ..... Pavilion
Palmer, Rebecca ..... Session B .... Poster 119 ..... 4:00 p.m. ..... Pavilion
Parks, Tiffany ..... Session A ..... Poster 60 ..... 3:00 p.m. ..... Pavilion
Patel, Brijesh ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 226 Wellman
Patel, Reshma ..... Session C ..... Poster 82 ..... 5:00 p.m. ..... Pavilion
Patkar, Rasika ..... Session C ..... Poster 64 ..... 5:00 p.m. ..... Pavilion
Pavlik, Alfred ..... Session B ... Poster 104 ..... 4:00 p.m. ..... Pavilion
Peare, Anna ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 212 Wellman
Pearson, Sarah ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 202 Wellman
Perez, Ana Isabel ..... Session B ..... Poster 13 ..... 4:00 p.m. ..... Pavilion
Petkus, Bradley ..... Session B ... Poster 107 ..... 4:00 p.m. ..... Pavilion
Phelps, Sara ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 106 Wellman
PinaJr, Dagoberto ..... Session A ..... Poster 69 ..... 3:00 p.m. ..... Pavilion
Pollock, Sarah ..... Session 2 ..... Oral ..... 4:15 p.m. ..... 119 Wellman
Pompa-Hogan, Briana ..... Session A ..... Poster 68 ..... 3:00 p.m. ..... Pavilion
Ponna, Vimala ..... Session B .... Poster 113 ..... 4:00 p.m. ..... Pavilion
Poon, Lauren ..... Session B ..... Poster 88 ..... 4:00 p.m. ..... Pavilion
Pourhosseinzadeh, Mohammad Session B Poster 70 ..... 4:00 p.m. ..... Pavilion
Prasad, Shalvi ..... Session A ... Poster 120 ..... 3:00 p.m. ..... Pavilion
Promkhan, Phichit ..... Session A ..... Poster 5 ..... 3:00 p.m. ..... Pavilion
Qu, Roy ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 212 Wellman
Qu, Yunyao ..... Session A ..... Poster 18 ..... 3:00 p.m. ..... Pavilion
Quiroz, Veronica ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 6 Wellman
Rahim, Raisa ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 107 Wellman
Rai, Bhavana ..... Session 2 ..... Oral ..... 3:00 p.m. ..... 107 Wellman
Ram, Abhineet ..... Session B ..... Poster 85 ..... 4:00 p.m. ..... Pavilion
Ramirez, Anacary ..... Session B ..... Poster 17 ..... 4:00 p.m. ..... Pavilion
Ramirez, Eduardo ..... Session C ..... Poster 77 ..... 5:00 p.m. ..... Pavilion
Ramirez Perez, Susana ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 233 Wellman
Ramos, Sara ..... Session A ..... Poster 47 ..... 3:00 p.m. ..... Pavilion
Ravishankar, Pavitra ..... Session 2 ..... Oral ..... 3:15 p.m. ..... 2 Wellman
Rencken, Camerin ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 216 Wellman
Renner, Derrick ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 230 Wellman
Resnick, Alexandra ..... Session C ..... Poster 44 ..... 5:00 p.m. ..... Pavilion
Rewinski, Eva ..... Session C ..... Poster 99 ..... 5:00 p.m. ..... Pavilion
Reyes, Darin ..... Art Exhibit ..... 3:00 p.m. ..... Pavilion
Reynolds, Mack ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 2 Wellman
Rhine, Maya ..... Session A ..... Poster 58 ..... 3:00 p.m. ..... Pavilion
Rios, Cassandra ..... Session A ..... Poster 88 ..... 3:00 p.m. ..... Pavilion
Robinson, Amanda ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 207 Wellman
Rodriguez, Alan ..... Session A ..... Poster 72 ..... 3:00 p.m. ..... Pavilion
Rodriguez, Fabian ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 230 Wellman
Rodriguez, Javier ..... Session A ..... Poster 70 ..... 3:00 p.m. ..... Pavilion
Rogness, Nicholas ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 26 Wellman
Romero, Lino ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 233 Wellman
Rossman, Zoë ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 207 Wellman
Ruangkanit, Athina ..... Session C ..... Poster 88 ..... 5:00 p.m. ..... Pavilion
Ruano, Elizabeth ..... Session B ..... Poster 21 ..... 4:00 p.m. ..... Pavilion
Ruiz, Alejandra ..... Session A ..... Poster 11 ..... 3:00 p.m. ..... Pavilion
Ruiz, Yaquelin ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 126 Wellman
Ryan, Maggy ..... Session B ..... Poster 57 ..... 4:00 p.m. ..... Pavilion
Saakyan, Gayane ..... Session B ..... Poster 87 ..... 4:00 p.m. ..... Pavilion
Saavedra, Jean Abigail ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 119 Wellman
Saeteurn, Courtney ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 205 Wellman
Salazar-Campos, Kenya ..... Session B ..... Poster 12 ..... 4:00 p.m. ..... Pavilion
Saleh, Perrie ..... Session A ..... Poster 71 ..... 3:00 p.m. ..... Pavilion
Salim, Rangeena ..... Session A ..... Poster 44 ..... 3:00 p.m. ..... Pavilion
Sanchez, Estevan ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 6 Wellman
Sannajust, Kimberley ..... Session B ..... Poster 46 ..... 4:00 p.m. ..... Pavilion
Santosh, Sneha ..... Session B ..... Poster 68 ..... 4:00 p.m. ..... Pavilion
Sanz, Reina Marie ..... Session A .... Poster 112 ..... 3:00 p.m. ..... Pavilion
Sasagawa, Koki ..... Session C ..... Poster 49 ..... 5:00 p.m. ..... Pavilion
Sathisan, Chaithra ..... Session C ... Poster 108 ..... 5:00 p.m. ..... Pavilion
Sayed, Nada ..... Session C ..... Poster 92 ..... 5:00 p.m. ..... Pavilion
Schulz, Helen ..... Session A ..... Poster 26 ..... 3:00 p.m. ..... Pavilion
Schuster, Samantha ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 107 Wellman
Schwarz, Tommer ..... Session A ..... Poster 96 ..... 3:00 p.m. ..... Pavilion
Schweickert, Alyssa ..... Session C ..... Poster 85 ..... 5:00 p.m. ..... Pavilion
Scott, Grace ..... Session B ..... Poster 80 ..... 4:00 p.m. ..... Pavilion
Seale, Iman ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 126 Wellman

Seeley, Elizabeth ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 126 Wellman
Selna, Weston ..... Session A ..... Poster 6 ..... 3:00 p.m. ..... Pavilion
Shafi, Mahnoor ..... Session A ..... Poster 79 ..... 3:00 p.m. ..... Pavilion
Shafi, Zannain ..... Session A ..... Poster 80 ..... 3:00 p.m. ..... Pavilion
Sharma, Sweta ..... Session C ..... Poster 83 ..... 5:00 p.m. ..... Pavilion
Shea, Troy ..... Session A ... Poster 103 ..... 3:00 p.m. ..... Pavilion
Shepard, Ashley ..... Session C ..... Poster 6 ..... 5:00 p.m. ..... Pavilion
Sheppard, Hadley ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 2 Wellman
Sherman, Nicholas ..... Session A ..... Poster 7 ..... 3:00 p.m. ..... Pavilion
Shin, Ariel ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 26 Wellman
Shojinaga, Melanie ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 2 Wellman
Shuai, Katherine ..... Session 1 ..... Oral ..... 1:45 p.m. ..... 205 Wellman
Sierra, Valentin ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 205 Wellman
Sikaroudi, Aria ..... Session 2 ..... Oral ..... 3:30 p.m. ..... 229 Wellman
Sims, Riley ..... Session C ..... Poster 23 ..... 5:00 p.m. ..... Pavilion
Singhal, Kartik ..... Session B ..... Poster 95 ..... 4:00 p.m. ..... Pavilion
Sohal, Tajinderpal ..... Session A ... Poster 105 ..... 3:00 p.m. ..... Pavilion
Sola, Ana Marija ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 6 Wellman
Sone, Pyae ..... Session 2 ..... Oral ..... 4:15 p.m. ..... 106 Wellman
Song, Yeonju ..... Session 1 ..... Oral ..... 2:00 p.m. ..... 207 Wellman
Sorensen, Jessica ..... Session B ..... Poster 29 ..... 4:00 p.m. ..... Pavilion
Squyres, Kaylin ..... Session C .... Poster 117 ..... 5:00 p.m. ..... Pavilion
Srisengfa, Yanin ..... Session B .... Poster 114 ..... 4:00 p.m. ..... Pavilion
Srivastava, Shubhangi ..... Session C ..... Poster 4 ..... 5:00 p.m. ..... Pavilion
Steinert, Jessica ..... Session B ..... Poster 33 ..... 4:00 p.m. ..... Pavilion
Stoltzfus, Jasmine ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 205 Wellman
Street, Ellen ..... Session C ..... Poster 1 ..... 5:00 p.m. ..... Pavilion
Su, Kevin ..... Session A ..... Poster 57 ..... 3:00 p.m. ..... Pavilion
Suarez, Sassan ..... Session C ..... Poster 35 ..... 5:00 p.m. ..... Pavilion
Sun, Mengxue (Fiona) ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 119 Wellman
Talavera, Vanessa ..... Session B ..... Poster 12 ..... 4:00 p.m. ..... Pavilion
Tallapragada, Sindhoora ..... Session C .... Poster 113 ..... 5:00 p.m. ..... Pavilion
Tam, Mitchell ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 229 Wellman
Tan, Kaiming ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 230 Wellman
Tan, Phillip ..... Session C ..... Poster 31 ..... 5:00 p.m. ..... Pavilion
Tan, You You ..... Session A ..... Poster 61 ..... 3:00 p.m. ..... Pavilion
Tanaka, Naoto ..... Session 2 ..... Oral ..... 3:00 p.m. ..... 126 Wellman
Tang, Claudia ..... Session A ..... Poster 21 ..... 3:00 p.m. ..... Pavilion
Tangog, Ekaterina ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 6 Wellman
Tat, Lyvin ..... Session C ..... Poster 97 ..... 5:00 p.m. ..... Pavilion
Tenner, Mikaela ..... Session 2 ..... Oral ..... 4:00 p.m. ..... 216 Wellman
Tham, Addy ..... Session B ..... Poster 60 ..... 4:00 p.m. ..... Pavilion
Thorstensen, Matthew ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 207 Wellman
Tibbett, Emily ..... Session B ..... Poster 81 ..... 4:00 p.m. ..... Pavilion
Tolentino, Karl ..... Session C ..... Poster 111 ..... 5:00 p.m. ..... Pavilion
Torres, Teresa ..... Session A ..... Poster 78 ..... 3:00 p.m. ..... Pavilion
Torrest, Audrey ..... Session C ..... Poster 56 ..... 5:00 p.m. ..... Pavilion
Toussi, Atrin ..... Session 1 ..... Oral ..... 1:15 p.m. ..... 126 Wellman
Tran, Kevin ..... Session C .... Poster 101 ..... 5:00 p.m. ..... Pavilion
Tran, Khanh ..... Session A ..... Poster 13 ..... 3:00 p.m. ..... Pavilion
Tran, Laura ..... Session A ..... Poster 61 ..... 3:00 p.m. ..... Pavilion
Tran, Michelle ..... Session A ..... Poster 19 ..... 3:00 p.m. ..... Pavilion
Treves, Guy ..... Session B ... Poster 100 ..... 4:00 p.m. ..... Pavilion
Trinh, Vivian ..... Session C ..... Poster 40 ..... 5:00 p.m. ..... Pavilion
Tsang, Josephine ..... Session B ..... Poster 44 ..... 4:00 p.m. ..... Pavilion
Tyer, Carly ..... Session 2 ..... Oral ..... 4:15 p.m. ..... 226 Wellman
Uchiyama, Lauren ..... Session 1 ..... Oral ..... 1:00 p.m. ..... 107 Wellman
Umarov, Temur ..... Session B ..... Poster 48 ..... 4:00 p.m. ..... Pavilion
Vaddadi, Sneha ..... Session A ..... Poster 64 ..... 3:00 p.m. ..... Pavilion
Vahldick, Hannah ..... Session A .... Poster 110 ..... 3:00 p.m. ..... Pavilion
Valdez, Venecia ..... Session C ..... Poster 55 ..... 5:00 p.m. ..... Pavilion
Vaquero, Jorge ..... Session B ..... Poster 51 ..... 4:00 p.m. ..... Pavilion
Vieira, Candice ..... Session A ..... Poster 74 ..... 3:00 p.m. ..... Pavilion
Villanueva, Izabela ..... Session 1 ..... Oral ..... 1:30 p.m. ..... 126 Wellman
Vincent, Marcus ..... Session A ..... Poster 84 ..... 3:00 p.m. ..... Pavilion
Vo, Thai-Thanh ..... Session B ... Poster 102 ..... 4:00 p.m. ..... Pavilion
Walke, Jillian ..... Session C .... Poster 115 ..... 5:00 p.m. ..... Pavilion
Walsh, Kyle ..... Session 2 ..... Oral ..... 3:45 p.m. ..... 207 Wellman
Wang, Cathy ..... Session A ..... Poster 36 ..... 3:00 p.m. ..... Pavilion
Wang, Yini ..... Session B ..... Poster 17 ..... 4:00 p.m. ..... Pavilion
Weisz, Daniel ..... Session C ..... Poster 15 ..... 5:00 p.m. ..... Pavilion
West, Jessica ..... Session 2 ..... Oral ..... 4:15 p.m. ..... 229 Wellman
Weyers, Brent ..... Session C ... Poster 107 ..... 5:00 p.m. ..... Pavilion
Whitehead, Andrew ..... Session C ..... Poster 59 ..... 5:00 p.m. ..... Pavilion
Wild, Joshua ..... Session A ..... Poster 22 ..... 3:00 p.m. ..... Pavilion
Williams, Brenna ..... Session B ..... Poster 31 ..... 4:00 p.m. ..... Pavilion
Williams, Justice ..... Session C ..... Poster 81 ..... 5:00 p.m. ..... Pavilion
Williams, Lauren ..... Session B ..... Poster 49 ..... 4:00 p.m. ..... Pavilion
Williams, Sequoia ..... Session C ..... Poster 87 ..... 5:00 p.m. ..... Pavilion
Wong, Andrea ..... Session C .... Poster 116 ..... 5:00 p.m. ..... Pavilion
Wong, Joyce ..... Session C ..... Poster 88 ..... 5:00 p.m. ..... Pavilion
Wong, Suk Wah ..... Session 1 ..... Oral ..... 1:00 p.m. ..... 230 Wellman
Wong Chang, Maria Angelica ..... Session 1 ..... Oral ..... 2:15 p.m. ..... 107 Wellman
Wright, Hailey ..... Session B ..... Poster 86 ..... 4:00 p.m. ..... Pavilion
Wu, Wanrong ..... Session A ..... Poster 29 ..... 3:00 p.m. ..... Pavilion
Xiong, Na ..... Session A ..... Poster 94 ..... 3:00 p.m. ..... Pavilion
Xu, Karen ..... Session 2 ..... Oral ..... 3:00 p.m. ..... 202 Wellman
Yadav-Ranjan, Krisha ..... Session C ..... Poster 58 ..... 5:00 p.m. ..... Pavilion
Ye, Lei ..... Session C ..... Poster 37 ..... 5:00 p.m. ..... Pavilion
Yeh, Max ..... Session A ..... Poster 9 ..... 3:00 p.m. ..... Pavilion

Yonenaga, Jenna	Session C	Poster 52	5:00 p.m.	Pavilion
Yourstone, Bret	Session 2	Oral	4:15 p.m.	126 Wellman
Yu, Kevin	Session B	Poster 65	4:00 p.m.	Pavilion
Yu, Yetianyi	Session C	Poster 39	5:00 p.m.	Pavilion
Yun, Jason	Session C	Poster 102	5:00 p.m.	Pavilion
Zaorski, Zoe	Session B	Poster 23	4:00 p.m.	Pavilion
Zhang, Shuya(Iris)	Session B	Poster 76	4:00 p.m.	Pavilion
Zhang, Zheng	Session A	Poster 31	3:00 p.m.	Pavilion
Zhou, Dejie	Session 2	Oral	4:15 p.m.	212 Wellman
Zikry, Christopher	Session 1	Oral	2:00 p.m.	226 Wellman
Zou, Jiahan	Session A	Poster 27	3:00 p.m.	Pavilion
Zufelt, Mikaela	Session C	Poster 30	5:00 p.m.	Pavilion

2 Wellman Hall, Moderator: Wolf-Dietrich Heyer

1:00 Kimberley A. Berg – Genetics and Genomics
Characterization of Novel Factors in RNA:DNA Hybrid Metabolism

1:15 Kavita Dutta – Biological Sciences
The Role of Gái's Interactions With RGS and GoLoco Proteins in Neutrophil Chemotaxis

1:30 Mohan Koumar Murugesan – Biochemistry & Molecular Biology
Variation in Maternal mRNA Deposition in Drosophila melanogaster

1:45 Mack B. Reynolds – Biochemistry & Molecular Biology
Toxin-Mediated Inhibiton of Neutrophil Recruitment to Infected Areas Represents a Major Immune Evasion Strategy in Staphylococcus aureus

2:00 Hadley E. Sheppard – Genetics and Genomics
An Investigation of the Functional Consequences of Centromere Protein C Evolutionary Variation

2:15 Abou Ibrahim-Biangoro – Biochemistry & Molecular Biology
Characterization of a New Genomic Instability Mechanism: Multiple Invasions-Induced Rearrangements

6 Wellman Hall, Moderator: Narine Yegiyan

1:00 Caitlin Flaws – Gender, Sexuality and Women's Studies
Graphic Memoir and Embodiment: An Exploration of Gender, Sexuality, and Feminism Through the Medium of Graphic Novels

1:15 Sydney M. Heifler – History
Romance Comic Books and Magazines: The Cold War, Anti-Feminism, and Teaching Women Their Place

1:30 Rachel P. Levin – American Studies
Feminist Punk Rockers and New Media Fan Communities: How Patti Smith and Carrie Brownstein's Music and Memoirs Kindle a Generation of Music Rebels

1:45 Amanda Ong – English
Language and Gender in Feminist Science Fiction

2:00 Estevan M. Sanchez – African American & African Studies
Looking for the Perfect Beat: Hip-Hop Culture in the Middle East

2:15 Veronica Quiroz – Theatre and Dance
Can you Feel That?

26 Wellman Hall, Moderator: Giovanni Peri

1:00 Sean Ehrlich – Economics
The Environmental Policy and Pollution Intensity Impacts of International Trade

1:15 Neusha Etemad – English
A Literary Response to Inequality

1:30 Rehaan Jahanghir – Economics
The Implications of Large Windfall Gains on Socio-Economic Status

1:45 Amiel Leano – International Relations
Exporting Services: A Policy Perspective on Economic Growth From the ICT-BPO Industry in India and the Philippines

2:00 Simone Montague-Jackson – International Relations
Correlation of Economics and Racism in the U.S. and Global Sphere

2:15 Nicholas J. Rogness – Economics
The Economics of Recent Generational Conflict in the U.S.: Examining the Growth in Age-Based Wage Inequality Through A Supply and Demand Framework

106 Wellman Hall, Moderator: Michael Lazzara

1:00 Hailey Q. Barab – English
Disemboweling Binaries: How Monsters of the Gothic Genre Blur the Line Between Normative and Non-Normative Mental Health

1:15 Sara Z. Phelps – Spanish
Dreams, Children, and Ghosts: The Works of Nona Fernández

1:30 Vishal Chakraborty – Computer Science and Engineering
Yes, Meno Knowledge Is Possible

1:45 Sequoya Collins – History
Ritual Murder in Colonial Ghana

2:00 Stephanie I. Kim – English
Alfred Hitchcock's Psycho and Postmodernism: Mapping the Monster and Its Body Through Postmodern Criticism

2:15 Joseph Adams – Religious Studies
The "Evolutionary Religious Studies" Program

107 Wellman Hall, Moderator: Ken Kaplan

1:00 Lauren F. Uchiyama – Biochemistry & Molecular Biology
Characterizing the Role of Mitofusin GTPases in Mitochondrial DNA Maintenance

1:15 Claire H. Jaramishian – Cell Biology
Biochemical Regulation of Cin8 by the Aurora B Kinase

1:30 Nichole A. Lewis – Cell Biology
Biochemical Regulation of Bim1 Complexes During Anaphase Spindle Elongation

1:45 Christopher Ma – Pharmaceutical Chemistry
Roles of Topoisomerases in Meiotic Recombination

2:00 Samantha L. Schuster – Genetics and Genomics
Physiological Role of Brca2 During Meiotic Recombination

2:15 Maria Angelica Wong Chang – Pharmaceutical Chemistry
Effect of Msh4 N-Terminus Phosphorylation on Crossover Formation During Meiosis in Budding Yeast

119 Wellman Hall, Moderator: Cindy Huang

1:00 Amanda Eke – Gender, Sexuality and Women's Studies
To Be Young, Gifted and BLACK

1:15 Ana E. Maciel – Chicana/Chicano Studies
Mattering in the Borderlands: Testimonios of Undocumented Latinas/Chicanas/Xicanxs in Higher Education

1:30 Zion A. Mengesha – Linguistics
Teachers' Language Attitudes Toward African American English in California Public Schools

1:45 Cameron K. Mosier – Psychology
Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

2:00 Jean Abigail H. Saavedra – Psychology
Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

2:15 Mengxue (Fiona) Sun – Psychology
Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

126 Wellman Hall, Moderator: Bill McCarthy

1:00 Melissa E. Dittrich – Sociology
Conversation Changer: Reporting on Sexual Assault

1:15 Atrin Toussi – Religious Studies
The Role of Abortion in Turkish vs. United States Society

1:30 Izabela Villanueva – Psychology
Ethnic and Sexual Orientation Minority Status: Effects on Academic Self-Efficacy

1:45 Jennifer Herrera – Sociology
Is "Hey Sexy!" a Compliment or Harassment?: Interpretations of and Experiences With Street Harassment

2:00 Yaquelin Ruiz – Political Science
State Sanctioned Attitudes and Actions: Prejudice and Violence Against the Lesbian, Gay, Bisexual, and Transgender People of Russia

202 Wellman Hall, Moderator: Aldrin Gomes

1:00 Jenice X. Cheah – Neurobiology, Physiology and Behavior
Characterization of a Troponin I Mouse Model of Restrictive Cardiomyopathy

1:15 Brittany Cunningham – Marine and Coastal Science - Coastal Environmental Processes or Marine Environmental Chemistry
Morphological Effects of Bulk and Nano Zinc Oxide Sunscreens on Developing Strongylocentrotus purpuratus Embryos

1:30 Amy T. Du – Neurobiology, Physiology and Behavior
Transgenic Luciferase Reporters in Xenopus laevis Function Throughout Development

1:45 Tuleagh Innes-Gawn – Neurobiology, Physiology and Behavior
Effect of Partial Replacement of Murine Troponin I With Human Troponin I in a Mouse Model

2:00 Eduardo A. Gonzalez – Environmental Science and Management
Embryonic Exposure to Silver Nanoparticles Disrupts Neural Development in Zebrafish and Impairs Swimming Ability Later in Life

2:15 Jennifer Liang – Microbiology
Construction and Developmental Effects of In-Frame Deletions on Myxococcus xanthus Development

205 Wellman Hall, Moderator: Jessica Bissett Perea

1:00 Azka Fayyaz – History
Deconstructing the Malala Paradigm: An Anti-Imperial Insight Into the Circulation of the Nobel Prize Winner's Narrative

1:15 Carol E. Garcia – Anthropology
Beyond Exploitation: Storytelling the Bracero Program

1:30 Elisa Magallanes – Chicana/Chicano Studies
Proposing an In-Depth Examination of Working College Students' Experiences

1:45 Katherine W. Shuai – Sociology
State-Level Immigration Legislation

2:00 Valentin Sierra – Native American Studies
The Rise and Fall of AB101: Ethnic Studies Courses in Northern California's Public High Schools

2:15 Jasmine M. Stoltzfus – History
Visas for the Undocumented Irish: The Roots of the Diversity Immigrant Visa Program, 1987-1994

207 Wellman Hall, Moderator: Matthew Stuckey

1:00 Brittni A. Ming-Whitfield – Animal Science
Genome Wide Association Study for Genetic Markers of Myofibrillar Myopathy in Arabian Horses

1:15 Ashley B. Nola – Neurobiology, Physiology and Behavior
Effects of Silicate-Associated Osteoporosis and Age on the Equine Cervical Spine (Neck)

1:30 Amanda M. Robinson – Microbiology
Fuchs' Endothelial Corneal Dystrophy In Vitro Research Model: To Be or Not to Be?

1:45 Zoë T. Rossman – Evolution, Ecology and Biodiversity
Elephant-Initiated Interactions With Humans: Individual Differences and Specific Preferences

2:00 Yeonju Song – Chemical Engineering
Cellular Response of Rabbit Corneal Stromal Fibroblasts to Heat Shock Protein 90 Inhibition on Different Substrate Stiffness

2:15 Matthew Thorstensen – Wildlife, Fish and Conservation Biology
Simulating How Polyploid Sturgeon Respond to Genetic Bottlenecks

212 Wellman Hall, Moderator: Banafsheh Sadeghi

1:00 Laura J. Bell – Psychology
Identifying Behavioral Markers of Attention-Deficit/Hyperactivity Disorder in Infancy

1:15 Jose N. Galvez Hernandez – Biochemistry & Molecular Biology
Association Between Parental Nutrition and Exercise Habits and That of Their Mexican Heritage Children

1:30 Maria G. Navarro Nunez – Global Disease Biology
How Does an Unhealthy Diet Associate to School Performance in a Sample of Children From Ages 5 to 8 Years in California Central Valley?

1:45 Shaun I. Moncada – Human Development
Poverty, Contextual Factors and Academic Attainment of Children and Youth

2:00 Anna L. Peare – Community and Regional Development
The Latin American Child Migration Crisis and Mental Health Implications

2:15 Juliette N. Diveley – Human Development
Intergenerational Engagement: Crossing Generational Divides via Intentional Interaction

216 Wellman Hall, Moderator: Colleen Sweeney

1:00 Amanda M. Cruz – Cell Biology
Lrig1 Regulation of Canonical Wnt Signaling in Triple Negative Breast Cancer

1:15 Brian S. Imbiakha – Biochemistry & Molecular Biology
Natural Pseudotyping of HIV-1 With HTLV-2 Expands HIV-1 Tropism to Lower Female Genital Tract Epithelial Cells

1:30 Collin Matsumoto – Biological Sciences
Influence of Telomere Length and Autophagy on Stem Cell Fate Regulation

1:45 Don T. Nguyen – Global Disease Biology
PKC Agonists Increase HIV Reactivation From Latency Through the PKC-NF-kappaB, PKC-TEFb, and PKC-SP1 Signaling Pathways

2:00 Kristine S. Nishida – Cell Biology
The Role Low Molecular Weight Androgen Receptor Plays in Urothelial Bladder Cancer

2:15 Camerin A. Rencken – Global Disease Biology
Evaluation of a Point-of-Care 4th Generation HIV-1/2 Assay

226 Wellman Hall, Moderator: Michael Turelli

1:00 Michael G. Chavez – Biomedical Engineering
Mathematical Modeling of a Synthetic Bacterial Consortium

1:15 Bridget Devlin – Biomedical Engineering
Clinical Significance of Total Magnesium Concentration Versus Ionized Magnesium Significance

1:30 Preston M. Leung – Biomedical Engineering
Developing an Antioxidant Nanoparticle-Based Biosensor for Magnetic Resonance Imaging (MRI)

1:45 Brijesh Patel – Biomedical Engineering
Fabricating Light Guides With Rapid Prototyping Technologies for New PET Detectors

2:00 Christopher A. Zikry – Biomedical Engineering
Investigation of Biomineralized Scaffolds for Prolonging Osteogenic Markers in Mesenchymal Stem Cells

2:15 Catherine C. Mayo – Genetics and Genomics
Mapping Genes Controlling the Level of Cytoplasmic Incompatibility in Drosophila melanogaster

229 Wellman Hall, Moderator: Janine LaSalle

1:00 Roy Chu – Biotechnology
Meta-Analysis of DNA Methylation Differences in Autism

1:15 Gayathri Dileep – Neurobiology, Physiology and Behavior
Investigating Rbfox3 Sufficiency for SNORD116 RNA Cloud Formation

1:30 Ace Gonzalez – Genetics and Genomics
Elucidating the Roles of snoRNAs in Snord116 Deficient Mouse Models to Identify Disease Mechanisms in Prader-Willi Syndrome

1:45 Quang Minh Ha – Biochemistry & Molecular Biology
Using MeCP2 Chromatin Immuno-Precipitation Sequencing to Identify the Binding Sites of MeCP2 Proteins

2:00 Adriana Noronha – Genetics and Genomics
Evaluating Cognitive Abilities in a Female Mouse Model of Rett Syndrome

2:15 Mitchell Tam – Cell Biology
Finding Early Markers for Autism: Comparison of Global Methylation Assays for High Throughput Studies

230 Wellman Hall, Moderator: Soichiro Yamada

1:00 Suk Wah Wong – Nutrition Science
Health Benefits of Extra Virgin Olive Oil – A Literature Review

1:15 Kaiming Tan – Neurobiology, Physiology and Behavior
Popular Homemade Brazilian Mosquito Repellent Recipe May Be Misleading

1:30 Fabian Rodriguez – Religious Studies
Seeing Parts

1:45 Makena L. Ewald – Biomedical Engineering
Identifying the Extracellular Binding Partners of N-Cadherin and Its Implications for Cancer Cell Migration

2:00 Derrick J. Renner – Biomedical Engineering
Design and Fabrication of Large-Scale Cell Stretching Device for Identifying Force-Sensitive Protein Complexes

233 Wellman Hall, Moderator: Barbara Linke

1:00 Katherine Acord – Materials Science and Engineering
Microhardness assessment of 316L stainless steel fabricated by Laser Engineered Net Shaping

1:15 Yue Deng – Chemical Engineering
Towards Enhanced Photochemical Water Splitting Through Bacteriorhodopsin/ TiO2 Sol-Gel Composite

1:30 Lixian Huang – Materials Science and Engineering
Processing Induced Anomalous Superconductivity in Spark Plasma Sintered Bulk YBCO

1:45 Ada J. Kwong – Pharmaceutical Chemistry
Synthesis of Indanes via C-H Insertion

2:00 Susana Ramirez Perez – Mechanical Engineering
Manufacturing Distortion of Aluminum Parts for Aerospace Application

2:15 Lino Romero – Materials Science and Engineering
Structural Coalescence of $Fe_{25}Ni_{25}Co_{25}Al_{10}Ti_{15}$ High-Entropy Alloy Processed Through Mechanical Alloying

2 Wellman Hall, Moderator: Zachary Lewis

3:00 Leela Dixit – Biological Sciences
The Baby-Associated Built Environment (BABE) Microbiome Project

3:15 Pavitra Ravishankar – Microbiology
The Baby-Associated Built Environment (BABE) Microbiome Project

3:30 Melanie N. Shojinaga – Neurobiology, Physiology and Behavior
The Baby-Associated Built Environment (BABE) Microbiome Project

3:45 Manvir Kaur – Biological Sciences
Neonatal Bacterial Infection Leads to Behavioral Deficits in Adulthood

4:00 Kathleen L. Furtado – Animal Science
Effects of Human Lysozyme Transgenic Goat Milk on the Intestinal Microbiota of Pigs in a Dextran Sodium Sulfate-Induced Colitis Model

6 Wellman Hall, Moderator: Robert Berman

3:00 Lauren Ekman – Neurobiology, Physiology and Behavior
A Rodent Model to Assess the Effects of Sports-Related Concussion on Cognition Between Different Stages of Adolescence

3:15 Shadeh Ghaffari-Rafi – Neurobiology, Physiology and Behavior
Histamine Enhances Excitability in Hippocampal Neural Networks of Hibernating and Winter-Acclimated Non-Hibernating Syrian Hamsters

3:30 Shasta McMillen – Clinical Nutrition
Effects of Bovine Milk Fat Globule Membrane Supplementation on Cognitive Development in Rats

3:45 Ana Marija Sola – Neurobiology, Physiology and Behavior
Retino-Retinal Projections in Development of Ferret

4:00 Ekaterina A. Tangog – Neurobiology, Physiology and Behavior
Preparation for Mammalian Hibernation Is Insufficient to Induce the Increased Tolerance to OGD Seen During Deep Hibernation

26 Wellman Hall, Moderator: John Conway

3:00 Fanny Chow – Statistics
Who Should You Cite? Insights From Network Visualization of Scientific Articles

3:15 Daine L. Danielson – Physics
Neutrino Detector Design for Directional Mid-Field Nuclear Nonproliferation

3:30 Nur Syazana Natasha Hisham – Chemistry
Surface Microscopy Study of the Effects of Temperature on the Surface of Krypton Intercalated Graphite

3:45 Jessica Howard – Physics
The Search for Dark Matter at CMS Using the Higgs Boson

4:00 Ariel Shin – Computer Science
A Statistical Analysis of National High School Circuit Debate Rounds

4:15 Alexis A. Caligiuri – Science and Technology Studies
Snowden/Doctorow: Alternate Realities of the Surveillance State

106 Wellman Hall, Moderator: Luca Comai

3:00 Jonghoon Chang – Biochemistry & Molecular Biology
Understanding Interactions Between Key Proteins in Plant Defense Mechanism

3:15 Rosalva Flores – Biochemistry & Molecular Biology
Dynamics of Signal Transduction During Plant Defense Pathway

3:30 Yongam Lee – Biochemistry & Molecular Biology
Understanding the Function of ATG20 in Autophagy

3:45 Lynh Nguyen – Cell Biology
Identification and Characterization of Components Required for Chloroplast Stromule Biogenesis

4:00 Alexander Godbout – Biomedical Engineering
Computational Identification of Celiac-Toxic Peptides in Common Grains

4:15 Pyae Sone – Biochemistry & Molecular Biology
Phytohormone Induction of Solanaceous Hosts in Response to 'Candidatus Liberibacter solanacearum'

107 Wellman Hall, Moderator: Koen Van Rompay

3:00 Bhavana Rai – Biological Sciences
Cingulate Cortex Gray Matter Loss of Fragile X Pre-Mutation Carriers and Its Age-Dependency

3:15 Raisa A. Rahim – Psychology
Reversible Deactivation of the Posterior Parietal Cortex: Implications for Manual Grip Posture

3:30 Sanjana S. Naik – Biomedical Engineering
Infant Sanitation in Developing Economies of South and Southeast Asia: Current Conditions and Potential Solutions

3:45 Marisa L. Martinez – Psychology
The Role of Saliency in Young Infants' Visual Working Memory

4:00 Alexandra N. Jennings – Psychology
The Effect of Parental Scaffolding on Infant Behavior During Independent Play

119 Wellman Hall, Moderator: Bo Feng

3:00 Marcos A. Contreras Ramirez – Anthropology
More Than a Rock: Using Photogrammetry to Generate 3D Models of Lithic Artifacts

3:15 Jessica M. Jones – Community and Regional Development
Litigation vs. Collaboration

3:30 Allison Jones – Evolution, Ecology and Biodiversity
Applying Vocal Fingerprint Censusing to Non-Habituated Gibbons (Hylobates funereus) as a Conservation Tool in Sabah, Malaysia

3:45 Nimitha P. Kommoju – Linguistics
"One Day, One Minute, One Breath at a Time": Towards an Understanding of the Discourse of Recovery in an Online Pro-anorexia Forum

4:00 Rebecca Marshall – Psychology
Spontaneous Trait Transference: People Describing Others' Traits Affects Perceptions of Communicators

4:15 Sarah Pollock – Communication
Small Cues Make a Big Difference: Strategic Email Communication in Professional Contexts

126 Wellman Hall, Moderator: James Housefield

3:00 Naoto Tanaka – International Agricultural Development
Japanese Plant Imagery in the West, Late 19th to Early 20th Century

3:15 Emma Lingel-Gary – Art History
The Museum of Jurassic Technology in Context of the History of Museums

3:30 Iman Seale – Art History
American Residences in the Round: The Ideologies of Round Homes Across Time

3:45 Danielle Fabian Bronson – Art History
The Anarchic Semantics of Richard Mutt

4:00 Elizabeth G. Seeley – Art History
"A Religion of Sensuous Desire": The Ritualization of Eroticism Within Marcel Duchamp's Étant donnés

4:15 Bret Yourstone – Design
The Influence of the 1964 New York World's Fair on the Design Ideologies of Robert Moses and Walt Disney

202 Wellman Hall, Moderator: Mark Kessler

3:00 Karen Xu – Chinese
On Heroics: The Official National Narrative of Modern Chinese History

3:15 Lara M. France – History
Neither This nor That: French Women in Liberation and Postwar France

3:30 Jada Gilbert – Design
Catalan Modernisme and Nationalism: An Exploration of the Palau de la Música Catalana and the Sagrada Familia

3:45 Eric Olsen – Communication
Tracking the Historical Trajectory of Chinese-American Relations Through Media Representations

4:00 Sarah M. Pearson – French
Français de Souche, Français de Sol: National Identity and Immigration in Contemporary France

205 Wellman Hall, Moderator: Bagher Modjtahedi

3:00 Konrad L. Franco – Economics
Analyzing the Predictors of Substance Abuse Among Incarcerated and Non-Incarcerated Youth

3:15 Michelle Livingstone – Political Science – Public Service
Follow the Money or the (Party) Leader: The Effects of 'Yes' and 'No' Spending on California Citizen Initiative Outcomes

3:30 Mengyu Chen – Economics
The Secular Stagnation Hypothesis: A Critical Review of the Literature

3:45 Cristian Molina Cornejo – Economics
Energy Affordability in the United States: Some Descriptive Statistics

4:00 Hannah Dillman – Political Science – Public Service
Millennials and Political Messages on Social Media: What Types of Cues Work Best for Politicians?

4:15 Stephanie Bonham – Political Science
Incorporating Food Security into Hierarchical Cluster Analysis: How Food is Breaking the Welfare Typology Mold

207 Wellman Hall, Moderator: Helen Schurke Frasier

3:00 Grace Gordon – English
Mathematics in Gertrude Stein's "Q.E.D." and "Melanctha"

3:15 Austin B. Lim – English
Victorian Women and Their Collaborations With the Foreign and Forbidden in the Beetle

3:30 Lawrence Kotovets – Human Development
Why Do Men Buy T-Shirts? Discovering Consumer Needs Through the Jobs-to-Be-Done Theory

3:45 Kyle J. Walsh – History
The Ascension of Camden, South Carolina

4:00 Anna Paivinen – English
Consent in Early British Novels: The Ramifications Then and Now

4:15 Kayla M. Camilli – English
Jane Austen's Assertion of How Civility Transcends Class

212 Wellman Hall, Moderator: Cheemeng Tan

3:00 Tiani Calip – Cell Biology
PCB 95 Modulates Dendritic Arborization in Rat Hippocampal Neurons via Production of Reactive Oxygen Species

3:15 Xenia Ivanova – Biomedical Engineering
Translational Pharmacokinetic Analysis of Intravenous, Intramuscular, and Intraosseous Tranexamic Acid

3:30 Htet S. Ma – Biomedical Engineering
The Effect of Dose on the Onset and Progression of Radiation Induced Brain Necrosis in the Rodent Model

3:45 Rebecca A. Miller – Exercise Biology
A Successful In Vitro Model of an Engineered Equine Ligament

4:00 Roy W. Qu – Genetics and Genomics
Evaluation of a Potential Positive Feedback Loop in the Interplay Between Hypoxia and TGF-â Signaling in Osteoblasts

4:15 Dejie Zhou – Biomedical Engineering
Multifactorial Experimental Design to Optimize Fibrin Gels to Promote the Anti-Inflammatory and Proangiogenic Potential of Mesenchymal Stem Cells

216 Wellman Hall, Moderator: Darrell Hamamoto

3:00 Imran Ahmad – Managerial Economics
The Middle East and North Africa in U.S. Media Representations: An Analysis of the Term "Algeria" in the New York Times (1950-1959)

3:15 Lujain Al-Saleh – Environmental Science and Management
Drought and Water Scarcity Impacts on Women in the Middle East and North Africa (MENA) region

3:30 Alexis R. Chavez – Anthropology
The Middle East and North Africa in U.S Media Representations: An Analysis of the Term "Bedouin" in the New York Times (1930-1939)

3:45 Erik Kennedy-McDonnell – International Relations
One Thousand and One Nights of The New York Times: In the 1920s the NYT Rationalized Iraq With Allusion to the Arabian Nights

4:00 Mikaela N. Tenner – Political Science
Democracy and Intervention: An Analysis of Collective Military Intervention Under the European Union's Common Security and Defense Policy

4:15 Leslie L. Do – Asian American Studies
Post-Humanist Futures After Fukushima: Globalist, Robotic Takeover of Japan's Sovereignty

226 Wellman Hall, Moderator: John Yoder

3:00 Marcus A. Gainer – Biochemistry & Molecular Biology
Circadian Regulation of Floret Development in Helianthus annus

3:15 Tatiana Gromova – Biological Sciences
Characterization of Sunflower Core Clock Gene Function by Stable Transformation in Arabidopsis thaliana

3:30 Leandro Guerrero – Biochemistry & Molecular Biology
Expression of Aphid Salivary Proteins Under Estradiol Inducible Promoter in Arabidopsis

3:45 Nickey Kwa – Biochemistry & Molecular Biology
Optimizing Agrobacterium-Mediated Transient Gene Expression in Sunflower

4:00 Bao Nguyen – Biotechnology
Developing a Bacterial Isolate Collection From the Rice Root Microbiome

4:15 Carly L. Tyer – Biotechnology
Characterization of Plant Root Responses to Neighboring Plants

229 Wellman Hall, Moderator: Subramaniam Muralidharan

3:00 Randall L. Kuffel – Animal Biology
Impact of a Viral Pathogen on a Biological Control Agent: Population and Community Surveys

3:15 John M. Klyver – Microbiology
JNK Kinase Inhibition as a Way to Prevent the Transmission of the Malarial Parasite in the Anopheles Vector

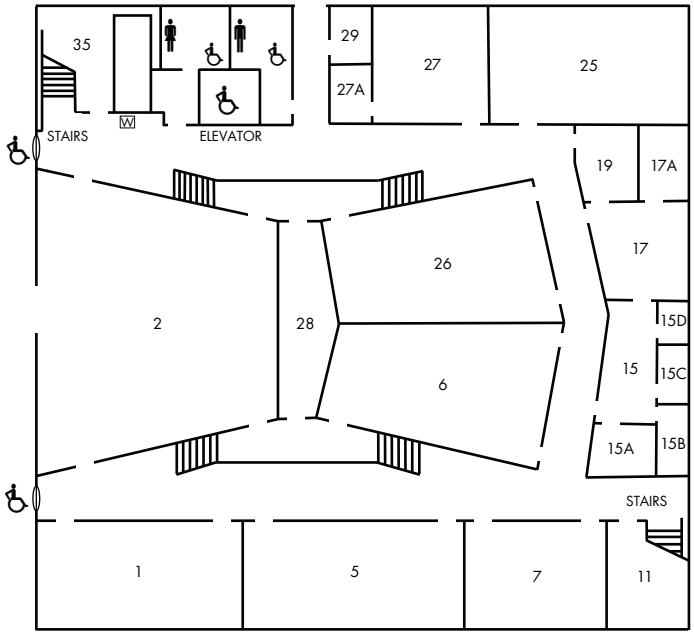
3:30 Aria Sikaroudi – Biological Sciences
Progressive Improvement of 3D Structure Resolution of HEV VLP Bound to Functionalized Gold-Nano Clusters (Au102-C_6MI)

3:45 Ryan B. Ko – Biochemistry & Molecular Biology
Determination of Metastable Conformations of HIV-1 Env Thorough Single Particle Reconstruction and a Statistical Population Isolation Approach

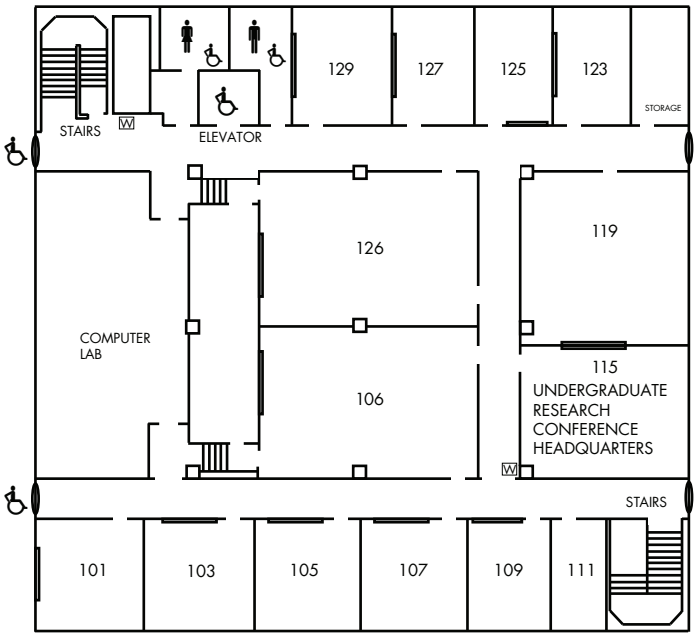
4:00 Juliana W. Noronha – Biochemistry & Molecular Biology
Conjugation of Genetically Engineered HEV-VLPs to Gold Nano-Clusters (Au102(pMBA)44) for VLP Tracking in Cells

4:15 Jessica D. West – Biochemistry & Molecular Biology
Seasonal Cues Induce Phenotypic Plasticity of Drosophila suzukii to Enhance Winter Survival

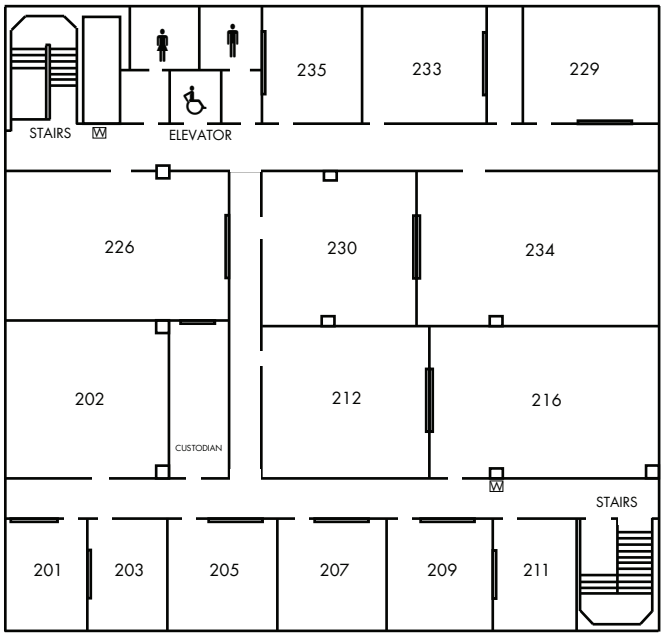
Lower Level



1st Floor



2nd Floor



= Building Entry - Exit = Wheelchair Access W = Water

= Front of Classroom

N
W E
S

ABSTRACTS

Microhardness Assessment of 316L Stainless Steel Fabricated By Laser Engineered Net Shaping

Katherine Acord
Sponsor: Julie Schoenung, Ph.D.
Chemical Engineering & Materials Science

Laser Engineered Net Shaping (LENS®) is a direct metal deposition processing technique that utilizes a high energy laser to melt metal powder and deposit material layer by layer forming a three dimensional structure. LENS® processing enables the formation of fine microstructures due to rapid solidification; however, the locally varying thermal history within the sample could alter the mechanical properties. Therefore, the goal of this study is twofold: 1) to assess the role of feedstock powder characteristics on microstructure and mechanical properties, and 2) to determine the potential for inhomogeneous mechanical behavior due to the thermal effect of LENS® processing. Two 316L austenitic stainless steel powders produced by gas atomization (GA) and water atomization (WA), respectively, were utilized during LENS® processing. Microindentation hardness testing was conducted such that groupings of microindentations span the entire cross section of each sample to systematically evaluate the positional mechanical properties. The accuracy of Vickers hardness testing has been evaluated against hardness values extrapolated from SEM and Confocal OM analysis of both samples. Findings elucidate the role of feedstock powder in controlling final properties of LENS® builds, while presenting a novel approach to thermal behavior assessment that accounts for the statistical significance of microhardness measurements.

The "Evolutionary Religious Studies" Program

Joseph Adams
Sponsor: Flagg Miller, Ph.D.
Religious Studies

Scholars have attempted to explain religion from a naturalistic perspective for centuries. A modern naturalistic theory of religion is David Sloan Wilson's 'evolutionary' account, which describes the role of natural selection in the emergence of religion in general and in the development and persistence of particular religious systems. Crucial to this explanatory paradigm is the notion of 'multi-level selection,' which describes how natural selection operates on group, individual, and 'memetic' survival units. Religions are said to evolve through an interplay of community-level adaptations, individual-level adaptations, and adaptations of ideas and practices themselves ('memes') that promote their own survival and proliferation through their being carried by humans. My project analyzes the 'evolutionary religious studies' program, clarifying the philosophical and biological 'nuts and bolts' of the causal structures involved. I will present an overview of some of the current empirical research being done within this program, and suggest possibilities for future research.

The Middle East and North Africa in U.S. Media Representations: An Analysis of the Term "Algeria" in the New York Times (1950-1959)

Imran Ahmad
Sponsor: Suad Joseph, Ph.D.
Anthropology

My research analyzes the representation of the Middle East and North Africa using textual sources from the New York Times (NYT) in the decade 1950–1949. As the NYT is considered a leading liberal news source, my research explores whether or not the NYT gives an accurate representation of the region during this period by focusing on one country—Algeria. I searched the term "Algeri*" in the ProQuest search engine and analyzed 1646 out of 8793 articles to investigate the pattern of representation of Algeria and the Algerian people during that time. In the context of World War II, the NYT also represented Algeria exclusively as an Allied front for the liberation of France. While the NYT portrayed Algeria largely as an extension of France up until World War II, the representation of Algeria began to shift with the rise of anti-colonial resistance against the French, with the United States beginning to urge a more "liberal" French policy in Algeria. This research is part of a larger project analyzing 150 years of the New York Times conducted in the lab of Dr. Suad Joseph.

Dissection of Anatomical Connectivity Between Deep Cerebellar Nuclei and Basolateral Amygdala

Jamie Ahn
Sponsor: Diasynou Fioravante, Ph.D.
Neurobiology, Physiology & Behavior

Cerebellum is a hindbrain structure traditionally known for its function in motor coordination. However, recent research suggests that cerebellum also plays an important role in cognitive and emotional processing, including regulation of learned fear. A key region of interest within the cerebellum is the deep cerebellar nuclei (DCN), through which the majority of cerebellar outputs are relayed. Establishing an anatomical connection between the DCN with the basolateral amygdala (BLA), a site critical for fear learning, provides the foundation upon which fear-related non-motor functions of mammalian cerebellum may be established. Viral and neuronal tracers tagged with fluorescent markers of different colors were stereotaxically injected into the DCN and the BLA in mice. Following stereotaxic surgery, mice were allowed to survive for 3-4 weeks, ensuring the spread of the tracers within target regions. Whole-animal transcardial perfusion was performed to fix the brain tissue. Then, tissues were histologically analyzed using confocal and epifluorescence microscopy.

Monitoring Factors Potentially Influencing the Built Environment Microbiome via Data-logging Sensors

Samir Akre
Sponsor: David Mills, Ph.D.
Viticulture & Enology

Bifidobacteria are a major component of gut microbiome of breast-fed infants. Colonization of the infant gastrointestinal tract by bifidobacteria is associated with several positive health outcomes. However, it is unknown how infants acquire bifidobacteria. Two possible hypotheses argue transmission from the mother, or alternatively, other infants. Live bifidobacteria found in built environments associated with mothers or infants may be a discriminating signature of potential transmission. In this study, designated lactation rooms were used to disentangle these two possible sources, as breast-feeding mothers are present in these rooms without their infants. These rooms were tested for bifidobacteria and positive results were attributed to the mothers. In order to account for the possible influence of temperature, relative humidity, and room usage on bifidobacteria deposition and survival, custom sensors were designed and installed in each room to monitor these factors and custom analysis software was written to interpret the data. Preliminary results indicate a negative relationship between humidity and room usage, and a comparison of room usage tracking via in-room sign-in sheets confirmed the accuracy of our infrared beam-break approach to tracking room usage. Continued usage of these tools will help clarify the mechanism by which bifidobacteria are transferred to newborn infants.

Drought, Water Scarcity Impacts, and Ecofeminism in Palestine and Jordan

Lujain Al-Saleh
Sponsor: Suad Joseph, Ph.D.
Anthropology

This project will determine how drought and water scarcity impacts women in Palestine and Jordan. Although drought conditions and water stress affects all people living in Palestine and Jordan, I argue that these specific environmental conditions disproportionately affect women. While an increasing number of environmental reports on drought and its relation to decreasing water supplies have concluded that women are affected disproportionately than men, most ecological studies on drought and water scarcity do not reflect or focus on how these particular issues are impacting women in urban and rural areas within Palestine and Jordan. Due to the gap in addressing these specific environmental issues and its relation to gender, I will focus on the ways in which women are working to solve problems related to drought and water scarcity along with commonalities and/or differences in how these solutions are being implemented. Ultimately, this research project investigates the multi-faceted, complex interactions between women, drought, water, and the environment in order to effectively guide environmental policies and strategies that address these gender disparities through effective drought and water management.

Gene Transfer for the Treatment of Giant Axonal Neuropathy: Preliminary Studies

Ruthe G. Ali
Sponsor: Alice Tarantal, Ph.D.
Cell Biology & Human Anatomy

Giant axonal neuropathy (GAN) is a rare disease characterized by giant axons with cytoskeletal derangements leading to progressive muscle weakness, impaired cognitive development, and poor prognosis for survival beyond the first decade of life. The disease is caused by a loss-of-function mutation in the GAN gene, which encodes for the protein gigaxonin. A therapeutic approach under consideration is to transfer a corrective gene to cure this inherited condition. Our studies are focused on gene transfer using adeno-associated virus (AAV) vectors with a reporter gene to test whether the gene can be inserted into neuronal cell populations. Assessments include quantitative PCR which confirmed the presence of the reporter gene and therefore uptake in cells in the cerebral hemispheres, cerebellum, and spinal cord in an animal model. Immunohistochemical assessments of neurons (Neuro-Chrom, pan-neuronal marker), astrocytes (glial fibrillary acidic protein), and oligodendrocytes (cyclic-nucleotide phosphodiesterase) demonstrated normal developmental patterns and comparable morphology when compared to control specimens. These preliminary studies provide the basis for further development of genetic therapy as a potential treatment for neurodevelopmental disorders such as GAN.

Cerenkov Radiation Activated Photodynamic Therapy in a Rat Brain Tumor Model

Raya Aliakbar
Sponsor: Laura Marcu, Ph.D.
Biomedical Engineering

Brain tumors are one of the most challenging forms of cancer to treat and there are nearly 70,000 new cases of primary brain tumors diagnosed each year. Photodynamic therapy is a medical treatment that uses a photosensitizer drug to convert light energy into reactive oxygen species, effectively destroying the diseased tissues. Widespread translation to the clinical setting has largely been inhibited by the limited penetration depth of light when using traditional external laser and LED light sources. Cerenkov radiation is a small amount of light generated from energetic charged particles, such as those emitted from radiopharmaceuticals and linear accelerators. It represents a potential solution to this problem by being able to deliver light noninvasively to deep tissues. In order to test whether Cerenkov radiation can activate the photodynamic therapy process, a study was conducted in a rat brain tumor model. Cancer cells were injected into the brains of 48 rats and following tumor formation, the rats received photosensitizer injections (TPPS2a) followed by a single radiotherapy treatment. Animals were monitored through weekly MRI scans to assess tumor growth or suppression. The efficacy of the treatment will be evaluated by tumor growth rates, tumor volume progression over time, and animal survival.

The Relationship Between FMRP Levels and Oxidative Stress in Fragile-X Premutation Carriers

Mor Alkaslasi
Sponsor: Paul Hagerman, M.D.,Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

Fragile-X Associated Tremor/Ataxia Syndrome (FXTAS) is a neurodegenerative disorder caused by premutation CGG-repeat expansions (55 – 200 repeats; normal <45 repeats) in the 5' untranslated region of the Fragile-X Mental Retardation 1 (FMR1) gene; the expanded repeats lead to reduced levels of the *FMR1* protein, FMRP. Recent studies have proposed an early role for mitochondrial dysfunction, and a subsequent increase in oxidative stress, in the development of FXTAS. This study aims to build on these findings to examine the relationship between the levels of FMRP and oxidative stress in carriers of the fragile-X premutation relative to those with normal CGG repeats. Human dermal fibroblasts from premutation carriers with FXTAS, carriers without FXTAS, and controls (normal CGG repeat) are being analyzed. To measure FMRP expression, a fluorescence resonance energy transfer (FRET) assay is being employed. To measure oxidative stress, flow cytometry with vital dyes will be used. I expect to see increased levels of oxidative stress in samples that have decreased levels of FMRP relative to normal.

Analysis of Newly Discovered Artifacts From the Mendocino National Forest, California

Jessica Almaraz
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

This study examines stone projectile points and formal artifacts from surface contexts found during the 2015 UC Davis Archaeological field school in the Mendocino National Forest. Our analysis of these stone artifacts stems from the fact that the age of these finds is still unknown. Artifacts found within the Central Coast Range survey area were mostly Franciscan chert, due to its natural abundance in the area. The presence of Borax Lake obsidian was a great addition to the stone tool collections, even though this material comprised a smaller portion of the assemblage. Projectile point shape and obsidian hydration analysis were used to establish the antiquity of these artifacts. X-Ray Fluorescence was applied to obsidian artifacts to analyze specific geochemistry establishing ties between artifact locations and distant material sources. This study provides further insight into the time frame of human activity in the area as well as new information regarding material resource procurement, exchange, mobility, and chronology in the Central Coast Range. These findings were the result of a collaborative effort between the US Forest Service, UC Davis, and Round Valley Yuki.

Cost-Effective 3D Modeling and Geometric-Morphometric Analyses Applied to Archaeological Artifacts: Advantages and Limits of the Method in Stone Tool

Aurora F. Allshouse
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

In the field of anthropology 3D imagery is commonly used to study the anatomical diversity of human fossil species. When applied to material culture such as stone tools, the advantages and limits of such methods are still poorly understood. The present study explores the potential of this technology to analyze variations in shape of archaeological artifacts. The goal is to identify the most accurate and time-effective method of generating data that is relevant for archaeological research questions. First, authentic and experimental stone tools are digitized using Agisoft Photoscan software. The 3D models are then imported in FEI Avizo analytic software to obtain the landmark coordinates. Following a geometric-morphometric approach, the landmarks are used to record quantitative data that captures the overall shape of the object. In addition, different sets of landmarks can be used to obtain measurements on specific features observed on the artifact. Ultimately, the measurements obtained are compared to identify the best methods to produce quantitative data on the overall shape of objects and on the qualitative features informative on their mode of production (e.g. negative scars of resharpening flakes).

Impact and Success of Microfinance Institutions in Developing Countries

Jelleny Altamirano
Sponsor: Janine L. Flathmann Wilson, Ph.D.
Economics

In recent years, microfinance institutions (MFI) have become prevalent in developing countries. An MFI is a financial institution that offers financial services to the poorest of the world's citizens who would otherwise not get loans from traditional financial institutions. Despite the popularity and widespread of MFIs, there has been debate about whether or not their main goal is to actually help the poor reach a level of financial stability. Some studies also suggest that the poorest people are not actually the MFI's main target. Through my research, I will look at different factors that determine what makes an MFI successful in terms of being sustainable and helping people escape from poverty. I will construct a model where I will analyze the data I find in order to determine in which countries MFIs are most successful in helping the poor reach a level of sustainability. I will also use my model to determine what factors contribute to a successful microfinance institution in order to determine where MFIs are having the greatest impact.

Testing the Localization Parameters of the DEP Domain Containing-1 Protein, LET-99

Jocelyn V. Alvarado
Sponsor: Lesilee S. Rose, Ph.D.
Molecular & Cellular Biology

Asymmetric division, a type of cell division, produces differently fated daughter cells and occurs during development by a variety of species. In Caenorhabditis elegans, a key regulator of asymmetric division is the DEP domain containing 1 (DEPDC1) family protein, LET-99. LET-99 is asymmetrically localized at the membrane, but it is unknown how it is anchored to the membrane. Previous *in vitro* assays have shown that LET-99's DEP domain is sufficient for association with phosphoinositol phosphates (PIPs) frequently found in the cell membrane. I am testing the hypothesis that the DEP domain is sufficient to localize LET-99 to the membrane in vivo. I have created constructs that express fragments of LET-99 fused to GFP. These constructs are transfected into *Xenopus A6* cell lines, which grow at similar temperatures to C. elegans and allow for faster testing of altered proteins. Localization of GFP will indicate which parts of the LET-99 protein target it to the membrane. I am also testing the hypothesis that PIPs are required for LET-99 localization in the C. elegans embryo by using RNAi to deplete kinases needed for PIP production. Together these studies will provide insight into how LET-99 is localized to the membrane during division.

The Development and Characterization of Cardiolipin-Specific Fluorescent Protein Markers

Meelad Amouzgar
Sponsor: Jodi Nunnari, Ph.D.
Molecular & Cellular Biology

Mitochondria are double-membrane organelles that generate most of the energy used by cells and play key roles in cellular growth, death and differentiation. Continuous remodeling and redistribution of the mitochondrial membrane structure are critical for integrating organelle physiology with cellular needs. Cardiolipin (CL) is a diphosphotidyl lipid found in bacteria and the mitochondrial inner membrane of eukaryotes. CL distribution within mitochondrial membranes is important in determining membrane structure, regulating bioenergetics, and recruiting factors. However, its exact distribution and functional localization within mitochondria is poorly understood because there exists no means for detecting and visualizing CL in live cells. We developed a CL sensor using the CL-binding properties of the "InsertB" domain of Mgm-1, a yeast mitochondrial inner membrane fusion protein. In *in vitro* assays, Insert B specifically binds CL-containing liposomes. In live yeast and mammalian cells, fluorescent-tagged Insert B protein forms distinct foci within mitochondria depending on the presence of CL. By making a series of mutations in highly conserved regions of Insert B, we are further characterizing the marker's affinity and specificity for CL. We are using this tool to better understand the localization and behavior of CL-enriched regions within mitochondrial membranes and its association with mitochondrial function.

The Relationship Between Imitation, Affiliation, and Social Sensitivity Genotypes in Rhesus Macaques (*Macaca mulatta*)

Jordan A. Anderson
Sponsor: Erin L. Kinnally, Ph.D.
Psychology

Understanding the evolution of complex social behaviors in primates helps us to understand why humans behave the way we do. Non-conscious imitation is a behavioral phenomenon which increases affiliation and likeability between transaction partners in humans and monkeys. This study aims to explore whether this phenomenon, termed the chameleon effect, is influenced by gene variants that confer sensitivity to the social environment, called social sensitivity genotypes. Fifteen juvenile rhesus macaques are being observed at the California National Primate Research Center three times a week for imitative and social behaviors. If the chameleon effect is present in the rhesus macaques, I should find a relationship between the degree of imitation exhibited by individuals and their rates of affiliation as well as their frequency of proximity and contact with other individuals. Further, 5-HTTLPR and MAOA-LPR are two well-documented social sensitivity genotypes that affect social behavior in primates, including humans. We predict that individuals with a greater number of "sensitivity alleles" will exhibit greater rates of imitation behavior. This research will help us understand the genetic underpinnings and social consequences of imitation behavior in rhesus macaques.

An Exploratory Study Into Infantilism

(Alex) Sandra Andrawis
Sponsor: Lisa L. Rapalyea, Ph.D.
Human Ecology

The purpose of this exploratory study is to gather information and improve understanding about Adult Baby/Diaper Lovers (AB/DL) practitioners who engage in atypical sexual fantasies and/or sexual behaviors. People who engage in AB/DL often face stigma and stereotyping which can affect them in adverse ways. This is a confidential and anonymous online survey, used to assess the similarities and differences between members of the AB/DL community and individuals from mainstream society. This study will identify specific behaviors and characteristics related to AB/DL, examine how these behaviors and characteristics may be related to relationship adjustment, and compare healthy vs. dysfunctional behaviors. Correlational and group comparison analyses will be used to determine if differences influence relationship adjustment and/or relationship style. The projected sample is 100 participants recruited for participation via AB/DL forums. Although AB/DL practitioners engage in what is viewed as atypical sexual behaviors and/or fantasies, it is expected that AB/DL behaviors fall within a clinically healthy range and that the majority of practitioners are not dysfunctional. Findings from this research will help distinguish actual behaviors from stereotypes about AB/DL sexual behaviors to inform clinicians and general population.

Pregnancy and Birth Complications in California Women Diagnosed With HIV: 1991-2010

Aileen Arevalo
Sponsor: Cheryl K. Walker, M.D.
Obstetrics & Gynecology
School of Medicine

The purpose of our study was to examine adverse outcomes associated with Human Immunodeficiency Virus (HIV) infection in pregnancy. This retrospective cohort study involved 10,430,138 California births between 1/1/1991-12/31/2010 derived from California's Office of Statewide Health Planning and Development. Separate models were generated for the subset of women with HIV to compare adverse outcome rates between women who gave birth before and after 12/31/1998. In adjusted analysis, women with HIV were 50% more likely to have essential hypertension and infants born to mothers with HIV were 80% more likely to be small-for-gestational age. In women with HIV, the rates of gestational diabetes and chronic hypertension doubled and tripled, respectively, in those who delivered 1999-2010 compared to those delivering 1991-1998. In addition, the cesarean rate doubled consistent with emerging recommendations regarding its protective role in reducing MTCT, and remained elevated during the second decade of observation despite broader use of highly active antiretroviral therapy (HAART) and reduced relative benefit from elective abdominal delivery. Dramatic elevations in maternal metabolic complications and evidence for placental insufficiency in recent years are likely due, at least in part, to broader use of HAART.

Reaching Up: Public Campus Resources Supporting California's Homeless Youth in Higher Education

Nancy Au
Sponsor: Nancy Erbstein, Ph.D.
Human Ecology

Studies reveal that the majority of California's unaccompanied homeless youth (ages 18–24) believe higher education is one of the primary ways of overcoming their circumstances. Yet, they face numerous barriers to college completion including maintaining enrollment. What resources exist at California's public higher education institutions to assist homeless undergraduate youth? I evaluate the presence, affordability, and extent of public campus-related resources. Data were collected from a sample of California Community Colleges (CCC), University of California (UC) and California State University (CSU) campus websites to evaluate the presence of applicable programs and services. The following areas of need were examined: mental health, child care, advising, supportive programs, housing, food assistance, and public transit. Findings were then weighted and compared. California's public campuses were found to have gaps in several resources, particularly in CCC housing as well as designated advisors and supportive programs for homeless students. While CCCs, CSUs, and UCs can further support this subgroup by directly providing additional resources, they also have the potential for even greater impact by partnering with counties to connect these youth with existing public programs. Additional research is needed to examine the concerns, awareness, and actual service utilization of homeless undergraduate youth.

The Effects of TNF-α on Engineered Ligament Function

Alec M. Avey
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

Tendonitis, an inflammatory disease that affects tendons, causes chronic pain. Tumor necrosis factor alpha (TNF-α) is an inflammatory cytokine believed to play a role in inflammatory tendonitis. This study was conducted to determine the affects of TNF-α on engineered ligament function. Cells isolated from human ACLs were used to engineer 3D ligament constructs *in vitro.* Constructs were treated the last 6 days of a two-week culture period with A)DMSO; B)1ng/ml; C)2.5ng/ml; or D)5ng/ml of TNF-α. After the treatment, we measured the maximal tensile load (MTL), ultimate tensile strength (UTS), modulus, and collagen content for each construct. Six days of TNF-α treatment reduced MTL (DMSO=1.5±0.19; 1ng/ml=0.9±0.21; 2.5ng/ml=0.6±0.18; 5ng/ml=0.4±0.08 N), UTS (DMSO=1.6±0.35; 1ng/ml=0.7±0.23; 2.5ng/ml=0.8±0.27; 5ng/ml=0.5±0.09 MPa), modulus (DMSO=11±1.6; 1ng/ml=5±1.5; 2.5ng/ml=6±2.0; 5ng/ml=4±0.9), and collagen content (DMSO=354±44.6; 1ng/ml=320±15.8; 2.5ng/ml=286±15.5; 5ng/ml=223±20.7) relative to the control, in a dose-dependent manner. Results show TNF-α having a negative effect on function by decreasing the production of collagen. We are now investigating the affects of curcumin, the active ingredient in the spice turmeric (and an anti-inflammatory) on engineered ligament function to see whether it can reverse the negative effects of TNF-α.

Treated Differently? Experiences Growing Up With Donor Origins

Fiona Babakhanians
Sponsor: Joanna E. Scheib, Ph.D.
Psychology

Families created with the assistance of an unknown sperm donor are becoming increasingly visible in the US. Whereas heterosexual couples with male infertility have used donor insemination (DI) the longest, growing numbers of planned DI-families include female same-sex partnered parents and single mothers. Research indicates that DI-children and adolescents are well adjusted with few differences across family structure (Scheib & Hastings, 2012). Little is known, however, about the experiences of DI-adults. This study investigates the experiences and wellbeing among a sample of DI-adults from one sperm bank in California. In semistructured phone interviews, DI-adults were asked about their experiences growing up and whether they felt they'd ever been treated differently due to being donor-conceived and/or raised in a non-heteronormative family. They also completed Rosenberg's (1979) Self-Esteem Scale as a measure of wellbeing. In a subsample of 30 interviews, we found that two-thirds reported being treated differently, most often negatively. Common reports included being teased in general and/or for having a non-heteronormative family, and feeling left out of father-child events. Further analysis will be conducted on the relationships between experiences, family structure, and measures of self-esteem. Study findings will contribute to a better understanding of the experiences of DI-adults.

Environmental Stress Induces Germline Apoptosis

Logan R. Bailey
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Cells experience DNA damage from internal reactions and external environmental stressors. Cellular pathways, collectively known as the *DNA damage response* (DDR), detect and repair DNA damage; alternatively, if damage is severe, the DDR directs cells to kill themselves (apoptosis). The DDR is well-studied in somatic (body) cells. However, the DDR's role in sexual cell division–meiosis–is poorly characterized. We show that when spermatocytes were exposed to stress conditions for 45 minutes, DDR proteins SUMO-1, γ-H2AX, and ATR were all overexpressed throughout all stages of meiotic prophase-I. Interestingly, late-stage (diplotene) cells showed a more dramatic response than earlier-stage (leptotene, zygotene, and pachytene) cells. Following removal of the stressor agents, leptotene, zygotene, and early-pachytene cells remained viable. Remarkably, most diplotene cells were unable to recover and died. This finding suggests that diplotene cells are especially vulnerable to environmental stress conditions. Given the increased stress-induced apoptotic rate of diplotene spermatocytes and the fact that oocytes arrest in late-diplotene (dictyate) state after birth, we hypothesize that the female germline is more vulnerable to environmental stress, while continuous spermatocyte production affords resistance to the male germline. We seek to elucidate the specific pathway through which stress response leads to apoptosis in meiotic cells.

Effects of Estrogen on Early Development in Sea Urchin and Sea Star Embryos

Melissa L. Bailey
Sponsor: Gary N. Cherr, Ph.D.
Environmental Toxicology

17α-Ethinyl Estradiol (EE2) is a synthetic estrogen found in birth control and is a Pharmaceuticals and Personal Care Product (PPCP). PPCP's are important to monitor and investigate, due to their effects on bodies of water and their inhabitants. Little research has been done on the effects EE2 and its endogenous form 17α-Estradiol (E2) on the early stages of development in echinoderms. Even less research has been conducted on the possible effects of apoptosis from estradiol exposure on the developing stages. This experiment demonstrated that EE2 has a larger effect on morphological abnormalities in developing Purple Sea Urchins (Strongylocentrotus purpuratus) and Bat Stars (Patiria miniata) than endogenous E2. Trial findings also suggest that the blastula and gastrula stages of development are more sensitive to estradiol exposure than the cleavage stage or a full 96 hour exposure period post fertilization, indicating developmental stage-specific toxicity. TUNEL assay data provided trends which suggest that apoptosis is increased in sea star and sea urchin embryos due to estradiol exposure. This study indicates that the Purple Sea Urchin and Bat Star population stability is at a risk, furthermore demonstrating the severity of the effects of PPCP's on aquatic organisms.

A Comprehensive Review of Metabolic Diseases and Gut Microbiota Dependent TMAO as a Potential Biomarker

Christa P. Baker
Sponsor: Carolyn Slupsky, Ph.D.
Nutrition

Microbiota in the mammalian gastrointestinal tract convert ingested protein into trimethylamine, a metabolite oxidized into TMAO by the host. Ample research has demonstrated a mechanistic link between serum TMAO levels and metabolic diseases. Recently, there have been many review articles addressing the link between TMAO and cardiovascular disease; however, a comprehensive review of all TMAO related diseases is necessary in order to fully understand TMAO's potential impact on human health. In this project, I synthesized a mini-literature review relating TMAO and disease incidence, and proposed a mechanism connecting TMAO's metabolic path with cardiovascular disease, kidney disease, diabetes and other metabolic disease pathways. Unexpectedly, I found the steps involved in regulating TMAO metabolism were also seen in disease related steps. This suggests that the TMAO metabolite may not directly promote disease progression, but rather, the regulators involved in the synthesis of TMAO are also positive regulators of metabolic diseases. Fully understanding how TMAO's mechanism relates to disease will provide useful insight into creating new, innovative measures in preventing disease.

Optimization of Covaris Settings for Shearing Bacterial Genomic DNA by Focused Ultrasonication and Analysis Using Agilent 2200 TapeStation

Rebecca M. Baker
Sponsor: Bart C. Weimer, Ph.D.
Population Health & Reproduction
School of Veterinary Medicine

Shearing of bacterial gDNA within a specific size range prior to sequencing library construction is a critical step in Next Generation Sequencing workflows. The quality control of the sheared bacterial gDNA is required in large multiplexed formats for large volume workflows, such as those used in the 100K Pathogen Genome Sequencing Project. Using the Covaris E220 instrument, the power and treatment time were varied to determine the effect on the optimal fragment size (150–350 bp) in the resulting sheared gDNA of four bacterial pathogens: *Salmonella enterica* subsp. *enterica* serovar Saint Paul strain Sp3 and serovar Typhimurium strain LT2, *Klebsiella* sp. and *Vibrio* spp. DNA fragment quantification and sizing were measured using an Agilent 2200 TapeStation system, and Agilent High Sensitivity D1000 ScreenTape assay. The 2200 TapeStation system was suitable to determine size distribution after fragmentation of gDNA in a 96-well plate format, a format suitable for high-throughput workflow and compatible with shearing technologies that use a 96-well plate multiplexed format. This approach enabled the measurement of gDNA and sheared DNA using a single technology.

Effect of Light Intensity and Virus Infection on Aphid-Plant Interactions

Laura T. Baldwin
Sponsor: Clare Casteel, Ph.D.
Plant Pathology

Turnip mosaic virus (TuMV) is an economically important virus vectored by many species of aphids. TuMV causes numerous diseases in cruciferous vegetables, among other plants. Previous studies have shown that the green peach aphid, *Myzus persicae*, produces more offspring on TuMV-infected plants than on control plants. The purpose of this study is to determine how light intensity affects virus-vector-plant interactions. First, we examined aphid fecundity on TuMV-infected or mock-inoculated *Arabidopsis thaliana* and *Nicotiana benthamiana* plants grown in normal or low-light conditions; the results show that low light increases plant susceptibility to TuMV and aphid vectors and there is an interactive effect of virus infection and low light. Currently, we are working to determine the mechanisms that lead to this observed increase in aphid fecundity. Reduced light may impair plant defenses against insects, and/or lead to increased nutritional value of the plant tissue. We are using counts of callose deposits to measure of the level of activation of plant defenses, and amino acid assays to reveal differences in nutritional content. In the future, analysis of plant defense hormones may also provide valuable insight into the effects of low light on this plant-virus-vector interaction.

The Effects of Intranasal Vasopressin Administration on Behavior in the Prairie Vole (*Microtus ochrogaster*)

Jessica Balland
Sponsor: Adele M. Seelke, Ph.D.
Psychology

Arginine vasopressin (AVP) is a neuropeptide, which has been linked to certain aspects of social behavior including aggression, playfulness, and social recognition. Additionally, AVP has been implicated in neurodevelopmental disorders, such as autism. Currently, a clinical trial is investigating the acute effects of intranasal AVP in children with autism; however, no studies have reported on the chronic effects of intranasal AVP administration in either human or animal models. Using the monogamous prairie vole as a rodent model, we examined the effects of intranasal AVP administration on partner preference formation in adulthood. Juvenile prairie voles were treated twice a day from post-natal day (P) 15 to 21 with one of three AVP doses (Low, 0.1 IU/kg; Medium, 1.0 IU/kg; High, 10.0 IU/kg) or a saline control. Then, at P42, all animals were subjected to the partner preference paradigm, which was run twice to test for both facilitations and deficits in pair bond formation. We hypothesize that the AVP treatments will inhibit pair bonding due to the fact that AVP also plays a role in novelty preference, increasing the preference for unfamiliar mate conspecifics. The results of this study will help provide insight for current and future investigations involving intranasal AVP administration.

Monitoring Factors Potentially Influencing the Built Environment Microbiome via Data-Logging Sensors

Priyanka Bapat
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Bifidobacteria are a major component of gut microbiome of breast-fed infants. Colonization of the infant gastrointestinal tract by bifidobacteria is associated with several positive health outcomes. However, it is unknown how infants acquire bifidobacteria. Two possible hypotheses argue transmission from the mother, or alternatively, other infants. Live bifidobacteria found in built environments associated with mothers or infants may be a discriminating signature of potential transmission. In this study, designated lactation rooms were used to disentangle these two possible sources, as breast-feeding mothers are present in these rooms without their infants. These rooms were tested for bifidobacteria and positive results were attributed to the mothers. In order to account for the possible influence of temperature, relative humidity, and room usage on bifidobacteria deposition and survival, custom sensors were designed and installed in each room to monitor these factors and custom analysis software was written to interpret the data. Preliminary results indicate a negative relationship between humidity and room usage, and a comparison of room usage tracking via in-room sign-in sheets confirmed the accuracy of our infrared beam-break approach to tracking room usage. Continued usage of these tools will help clarify the mechanism by which bifidobacteria are transferred to newborn infants.

Disemboweling Binaries: How Monsters of the Gothic Genre Blur the Line Between Normative and Non-Normative Mental Health

Hailey Q. Barab
Sponsor: Colin Milburn, Ph.D.
English

Good/evil, victim/oppressor, sane/insane: binaries sit at the forefront of a fragmented society. As a product of societal structuralism and categorization, binaries standardize and limit what is considered to be normative and non-normative. This results in a fear of the unknown, of mixtures and hybrids that constantly reappear as the monsters of horror fiction. My research focuses on novels and films such as *Dracula, The Strange Case of Dr. Jekyll and Mr. Hyde, Pyscho, and The Texas Chainsaw Massacre* to argue how the Gothic genre rebukes society's stigmatization of those with non-normative health, especially when juxtaposing them with able-bodied characters. I argue that monsters disembowel the binary system by creating a sense of normalcy and logic despite their display of non-normative mental behaviors. By examining works that span from the late nineteenth century to the late twentieth century, I aim to explore historically how the role of science has shaped the development of gothic fiction: how the methods developed to treat mental disorders have mirrored advances in psychological science, how normal versus pathological binary concepts in medical and societal thought have shifted over time, and how these changes have molded the monster's condition within this binary.

Stable Isotope Analysis of Human First and Third Molars from American Samoa

Juliana C. Bartel
Sponsor: Jelmer W. Eerkens, Ph.D.
Anthropology

Stable isotope analysis of human remains, specifically collagen from the dentin of human teeth, can tell us the dietary patterns as well as the age of weaning, of societies from long ago. This study focuses on five sites from American Samoa that date between 1600 years ago and historic times: Fatu-ma-futi, Pavaiai, Auto, Lauli'i, and Ili'Ili. The burials range in age from subadult to over forty and contain a range of males and females, as well as individuals of indeterminate sex. From previous isotopic analysis of human bone and evidence found at these archaeological sites, we expect to see a shift over time from a marine-focused to terrestrial-focused diet, indicated by a shift in the concentration of Carbon 13 relative to Carbon 12 isotopes. This study also estimates the age of weaning in individuals by analyzing the Nitrogen isotopic signatures in serial samples from first molars, which develop earlier in life, and whether young children consumed significant amounts of marine-derived foods.

Examining the Effects of Aging and Disuse Atrophy of Skeletal Muscles Through Cross Sectional Area Analysis of TA Muscle From 9- and 29-Month Old Rats

Madeleine Barth
Sponsor: Sue Bodine, Ph.D.
Neurobiology, Physiology & Behavior

It is well known that aging is associated with loss of skeletal muscle mass, strength and quality. This loss of skeletal muscle mass and function has adverse affects towards the quality of life of the elderly and can lead to increased risks for disability and death. Therefore it is important to understand the mechanisms underlying the age related changes in skeletal muscle mass and function. Changes in skeletal muscle mass are correlated with the size of muscle fiber cross-sectional area. Therefore, we wanted to understand the effect of aging on disuse related atrophy and recovery of skeletal muscle through examining changes in muscle fiber composition and cross-sectional area. Nine-month and 29-month old male F344BN rats underwent 14 days of hindlimb unloading (HU) and either 3-, 7-, 14-, or 28-days of hindlimb reloading (REL). Tibialis anterior (TA) muscles were pinned and frozen on liquid N2-cooled isopentane and stored at -80°C until sectioning. Muscles were cut into 10 ìm sections and stained with antibodies against myosin heavy chains to identify fiber types. Axiovision software will be used to measure fiber specific cross-sectional area for each group at each age.

Identifying Barriers to Diabetes Management and Areas of Knowledge Deficit About Type 2 Diabetes Among the Homeless Population

Angela M. Bassal
Sponsor: Jaesu Han, M.D.
Psychiatry & Behavioral Sciences
School of Medicine

It is estimated that more than 8.3% of individuals who are homeless in the United States suffer from diabetes mellitus - a chronic metabolic disease resulting from genetics and/or one's lifestyle. Regardless of one's background and income level, managing this lifelong disease poses a variety of challenges for all diagnosed individuals. However, with limited preventative healthcare resources and access to healthcare, homeless individuals undoubtedly experience a multitude of barriers when managing their diabetes. We are interested in identifying in a population of type 2 diabetic homeless individuals where the greatest deficits in knowledge about type 2 diabetes mellitus exist. We also strive to identify the most common barriers these individuals face in their attempts to manage their condition. Our aim is to survey approximately 40 homeless individuals with type 2 diabetes who reside in Sacramento, with the purpose of quantifying the individual's level of knowledge about diabetes and identifying the barriers he/she faces in managing his/her condition. By shedding light on the gaps in knowledge about type 2 diabetes and on the diabetes management barriers faced by homeless individuals, our goal is to improve educational and support resources to best fit the needs of homeless individuals with diabetes mellitus.

Using immunofluorescence to optimize transfection efficiency of a fungal metalloprotease (Mpr1) in Human Embryonic Kidney (HEK) cells

Reina Angelica S. Bassil
Sponsor: Angela Gelli, Ph.D.
Pharmacology
School of Medicine

Cryptococcus neoformans is the leading cause of fungal meningitis, a life-threatening fungal infection of the central nervous system. There are over 1 million cases of cryptococcosis, and 600,000 deaths annually. This pathogen enters the respiratory system through inhalation of spores, migrates through the blood, crosses the blood-brain barrier, and enters the central nervous system. Our research group has identified a novel fungal metalloprotease (Mpr1) in the extracellular proteome of *C. neoformans* that is necessary for the pathogen to breach the BBB in *in vitro* and *in vivo* models. Expression of recombinant Mpr1 in fungi has been difficult due to Mpr1 toxicity. The goal of this study is to express Mpr1 in human embryonic kidney (HEK) cells, as it would facilitate finding of substrates and inhibitors. This project focused on optimizing transfection conditions in HEK 293/T cells, and using immunofluorescence to determine transfection efficiency. Using either lipofectamine or polyethyleneimine, HEK 293/T cells were transfected with plasmids containing Mpr1 with an hemagglutinin tag, labeled with anti-HA antibodies, and imaged using a fluorescent microscope. Mpr1 was most efficiently transfected by lower ratios of lipofectamine and DNA. From here, Mpr1 can be efficiently expressed for use in the HaloTag purification system.

Identifying Behavioral Markers of Attention-Deficit/Hyperactivity Disorder in Infancy

Laura J. Bell
Sponsor: Sally Ozonoff, Ph.D.
Psychiatry & Behavioral Sciences
School of Medicine

Research indicates that children diagnosed with attention-deficit/hyperactivity disorder (ADHD) experience broad-based, long-term negative outcomes, making it important to identify at-risk children early in order to begin interventions as early as possible. Prospective, longitudinal studies using second-by-second behavioral coding from video have been effective for identifying early behavioral markers of other neurodevelopmental disorders, particularly autism spectrum disorder (ASD). Thus, in the current study, we implemented the same methods that have been successfully used in ASD to identify early behavioral markers of ADHD. Specifically, we developed a coding system for quantifying infant behaviors indicative of ADHD-related symptoms (e.g., hyperactivity, inattention, impulsivity, etc.). In this study, we will apply this behavioral coding system to prospectively-collected videos of infants at 12, 18, 24, and 36 months of age. All infants have returned for a follow-up assessment between the ages of 8-11 years, at which point diagnostic outcomes were determined. Analyses will compare coded behaviors of infants who later developed ADHD with those of infants who developed typically. Preliminary data indicate that ADHD-related behaviors are measurable in infancy and distinguish the groups. Our findings will contribute to the currently limited body of research on infant/toddler behavioral markers of ADHD, potentially enabling earlier diagnosis and intervention.

Effects of Lyrics and Song Melodies on Personal Nostalgia

Nikhil Bellamkonda
Sponsor: Petr Janata, Ph.D.
Psychology

Music has been found to be an effective tool in evoking personal nostalgia complemented by music-evoked-autobiographical-memories. Greater familiarity with a song or its genre increases the possibility of experiencing nostalgia. While lyrics can effectively arouse nostalgic feelings, it is unknown whether the remaining components of a song: the instrumental tracks, devoid of the vocals, can do so to the same magnitude. This study investigates the effectiveness of instrumental auditory versions of songs in evoking nostalgia compared to that from reading the song's corresponding transcribed lyrics. Commercially popular songs across different genres, produced during the subject's mid-adolescence, are used. Subjects undergo a preliminary screening to survey their genre preferences and to assess their tendency to experience nostalgia. They are then surveyed following each stimulus to rate their response and elaborate on their perceived reaction to the stimulus. Both the magnitude of emotion experienced and the level of detail in recalled memories are evaluated.

Factors Influencing Aggressive Behaviors in Adolescents

Karina Beltrán
Sponsor: Daniel E. Choe, Ph.D.
Human Ecology

Research shows that contextual and individual risk factors can lead to maladaptive behaviors in children (Vilsaint et al., 2013), but more research is needed on what factors influence the development of aggression and how environmental factors affect adolescents. This study examines why some adolescents with higher attitudes towards violence (e.g., believing violence is acceptable) behave aggressively while others do not, and how neighborhood factors influence this relation. Specifically, this project examines how neighborhood qualities moderate the relation between violent attitudes and aggression in a low-income sample of 247 boys (51.4% Caucasian, 38.9% African American) from the Pitt Mother and Child Project (Shaw et al., 2012). Results show that adolescents who score low in violent attitudes report low levels of aggression regardless of neighborhood control, however, for adolescents who score high in violent attitudes, lower neighborhood control (e.g., willingness to intervene, reported by parents) predicts higher levels of aggression in adolescents than higher neighborhood control. The same pattern was found for neighborhood trust (e.g., trust among neighbors). These results suggest that the interaction of violent attitudes and neighborhood factors influence adolescents' aggression, and highlight the importance of considering individual risks, neighborhoods, and context for why individuals may behave aggressively.

Nrf2 Inhibition in Ischemic Heart Failure

Simranjeet S. Benipal
Sponsor: Anne A. Knowlton, M.D.
Pharmacology
School of Medicine

Protein nuclear factor (erythroid-derived 2)-like 2 (NRF2) is found in every cell in the human body and under normal conditions is bound in the cytosol. When under oxidative stress, NRF2 becomes unbound, and moves into nucleus transcriptionally activating the antioxidant response element (ARE) promoter region in turn causing production of antioxidant genes. Ischemic Heart Failure (IHF) is a chronic condition associated with oxidative stress due to the imbalance of reactive oxygen species (ROS) and antioxidants. Contrary to expectation, preliminary data has shown reduced NRF2 expression from repetitive ROS treatments (resembling chronic condition) versus single treatment. The interesting question is does Nrf2 inactivation with corresponding failure of antioxidant response contribute to the progression of IHF? Relating repetitive ROS exposure to alterations in NRF2 expression and activity, and determining if repetitive ROS causes mitochondria dysfunction and cell injury through NRF2 inactivation are key spotlights in our investigation. Understanding the mechanism of how and why Nrf2 functions in response to long-term oxidative stress can provide a potential therapeutic target for many diseases such as cancer, neuropathy, aging, diabetes, and heart failure. Utilizing both *in vitro* and *in vivo* models, this investigation's purpose is to analyze the redox signaling of NRF2 in IHF.

Characterization of Novel Factors in RNA:DNA Hybrid Metabolism

Kimberley A. Berg
Sponsor: Frédéric L. Chédin, Ph.D.
Molecular & Cellular Biology

RNA:DNA hybrid metabolism is an area of research that has been confronted by a paradox. Co-transcriptional RNA:DNA entanglements, or R-loops, form when an RNA transcript has the opportunity to anneal to a complementary strand of DNA, displacing the other strand of the DNA duplex. These three-stranded nucleic acid structures are known to cause genomic instability. However, research has also correlated R-loop formation with numerous biological processes, supporting the existence of R-loop-mediated pathways. Genome-wide mapping of R-loops further indicates that these structures are prevalent and form at conserved loci, supporting the idea the idea that R-loops possess physiological functions. Given this, I hypothesize that proteins have evolved to bind RNA:DNA hybrids and serve to mediate the function of these nucleic acid structures. The goal of this project is to characterize proteins that interact with RNA:DNA hybrids in order to answer two fundamental questions: 1) What are the molecular pathways in humans that mediate R-loop metabolism in normal cells; and 2) How do perturbations in R-loop metabolism lead to RNA:DNA hybrid-driven genomic instability as often observed in disease situations?

The Effect of Postmortem Interval on Oxytocin Receptor Density in the Brain

Shrishti Bhattarai
Sponsor: Sara M. Freeman, Ph.D.
Psychology

Oxytocin, a hormone produced in the hypothalamus is known for its role in promoting positive social behavior. Due to oxytocin's ability to modulate social behavior, it is currently used as an experimental therapeutic for individuals with autism spectrum disorder. However, it is currently unknown where oxytocin acts in the human brain. Studies are currently underway to determine the locations of the oxytocin receptor (OXTR) in human brain tissue. Human brain specimens vary in their postmortem interval (PMI), and tissues with a long PMI could have more degradation than tissues with a very low PMI. Because the PMI of human tissue cannot be manipulated, we designed a study to evaluate in rodent brain tissue whether PMI will have an impact on the degradation of OXTR. This study will determine the relationship between PMI and OXTR expression in prairie voles, a rodent species with well characterized neural OXTR expression. The results of this study will inform future studies of OXTR in human brain tissue, which will contribute to a more complete understanding of how oxytocin affects the human brain. Future research stemming from this study will allow us to better characterize the underlying neurobiology of social disorders like autism spectrum disorder.

Mapping Genes Controlling the Level of Cytoplasmic Incompatibility in *Drosophila melanogaster*

Jennifer G. Blanc
Sponsor: Michael Turelli, Ph.D.
Evolution & Ecology

Across species of *Drosophila, Wolbachia*, a maternally inherited endosymbiont, causes various levels of cytoplasmic incompatibility (CI) in crosses between infected males and uninfected females, resulting in reduced egg-hatch rates. Reynolds and Hoffmann (2002) discovered a nearly two-fold, statistically significant difference in the level of CI between two populations of *D. melanogaster*, Canton S (a laboratory stock from the early 20th century) and a recently established Australian stock. Their data indicated that the higher level of CI produced by the Australian stock is controlled by autosomal dominant alleles. This project aims to map the gene(s) responsible for the difference in CI. First we will look for variation in CI among *D. melanogaster* lines, including Canton S. We will identify and use high-CI and low-CI lines to create an F1 generation. The F1 males will be used in reciprocal crosses with uninfected females to look for the high-CI phenotype. If it is seen in both reciprocal crosses (as observed by Reynolds and Hoffmann, 2002), we will use "deletion mapping" to locate the autosomal allele(s) responsible. If we cannot replicate this observation, we will use reciprocal crosses to determine the relative contributions of *Drosophila* and *Wolbachia* genetic variation to variation in CI.

Attention Bias in Fragile X Syndrome

Taylor E. Bondi
Sponsor: Susan Rivera, Ph.D.
Psychology

Previous studies have shown that an attention bias towards threatening faces in children as young as 5 years is a risk factor for developing anxiety in adulthood (Bar-Haim et al., 2009; Bousquet & Egeland, 2006). The purpose of the current study is to investigate attention biases in typically developing younger children, and to compare the attention biases of a population that is genetically predisposed to anxiety (fragile X syndrome) to chronological and mental age- matched controls (Cordeiro et al., 2010). The current study uses an eye tracker to measure attention bias, which measures differences in visual attention to angry, happy, and neutral faces. Preliminary data show that children with fragile X syndrome (N=48, ages 7 months to 5 years) have an attention bias towards angry faces. Ongoing data collection involves comparing these data to age-matched controls. I predict that typically developing children will have a lower attention bias to angry faces than children with fragile X syndrome, and this bias will decrease with age. These results will contribute to a better understanding of how attention can play a role in the development of anxiety.

Comparison of Prehistoric and Historic Osseous Tools in Shaktoolik, Alaska

Katie Bonham
Sponsor: Cristyann Darwent, Ph.D.
Anthropology

In the 1830s the establishment of local Russian trading posts transformed the lives of the people of Shaktoolik, Alaska. The prehistoric population of Yup'ik people, who had been residing in this location for nearly 1000 years, was decimated by a small-pox epidemic. This resource-rich area abandoned by the Yup'ik, was quickly filled by Iñupiaq migrants from the Seward Peninsula region who remain in the area today. Excavations over the 2014 and 2015 summers at the Shaktoolik Airport site (NOB-72) resulted in the recovery of osseous tools and tool debitage that span the prehistoric to early historic periods, presenting the opportunity to study the effects of these events such as the introduction of metal implements. The chaîne opératoire method of analyzing osseous tool materials is used to determine the system of tool construction, and to investigate both the possible influence of trade metal in manufacture and differences of tool styles between the two native groups. This study aims to contribute to the current knowledge of osseous-tool technology and the effects of historic Russian trade in northern Alaska.

Incorporating Food Security into Hierarchical Cluster Analysis: How Food is Breaking the Welfare Typology Mold

Stephanie Bonham
Sponsor: Amber Boydstun, Ph.D.
Political Science

Food security, or a person's continuous access to sufficient, safe, and nutritious food, has become a political imperative in European social policy. While food security is an important policy area, it has been absent from the discussion of policy systems that provide social and economic security to a citizenry, otherwise known as welfare systems. Since Esping-Andersen's *Three Worlds of Welfare Capitalism* (1990), social scientists have focused on creating a typology for welfare systems. Most recently, academics have used Ward's Method of hierarchical cluster analysis to group welfare systems into six categories: Conservative-corporatist, Social-Democratic, Liberal, Former-USSR, Post-communist European, and Developing. I use to Ward's Method to test my following hypothesis: when using food security data, European countries will cluster according to economic and political development rather than the current typology scheme. The results support my hypothesis. I plan to write a case study for an outlying country, Belarus, and an average country, France, to further explain why food security indicators do not follow the accepted welfare system typology.

GFP Tagging of NIMA-Related Serine/Threonine Kinases in *Giardia*

Jacqueline Booker
Sponsor: Scott Dawson, Ph.D.
Microbiology & Molecular Genetics

Giardia is a binucleate microbial parasite that causes diarrheal disease in humans. NIMA-related serine/threonine kinases, or Neks, are known to localize in cilia and regulate cell division in eukaryotes. However, genome sequencing has shown that *Giardia* contains 198 Neks which is significantly larger than the 11 or fewer found in humans and other organisms. Further study of these proteins is needed, as some Nek genes appear to be fragments or encode active site mutations. Our research aims to further understand the role of these Neks in *Giardia* by tagging them with green fluorescent protein (GFP) and observing their localization. Through computational analysis, primers were created to amplify the *Giardia* gene encoding each candidate protein. Each gene was amplified via polymerase chain reaction (PCR), ligated into a Gateway entry vector and propagated in E. coli. Entry vectors were then recombined with a destination vector that includes the GFP gene, creating Neks with GFP fused to the C-terminal end. These vectors were introduced into *Giardia* via electroporation. The resulting proteins will be observed with fluorescence microscopy and are expected to localize in cellular structures that coordinate cell division or to other structures, suggesting novel functions of these proteins in *Giardia*.

Determination of Post-Translational Modifications of MXD3

Traci Bourne
Sponsor: Elva Diaz, Ph.D.
Pharmacology
School of Medicine

Glioblastomas are aggressive brain tumors that develop from transformed glial cells (Odjele, 2012). MXD3 is a transcription factor that has been found to be upregulated in glioblastomas (Barisone et. al., 2008 & Ngo et al, manuscript in preparation). Previous studies show that MXD3 is an important regulator of cell proliferation, as inhibition of MXD3 resulted in decreased proliferation, and apoptosis by sustained overexpression (Yun et. al, 2007 & Barisone et. al, 2012). The MXD3 protein runs at two distinct apparent molecular weights on immunoblots which suggests a post-translational modification (PTM) has occurred. One possible PTM is phosphorylation: the addition of a phosphate group onto the protein at sites containing serine, threonine or tyrosine amino acids. Phosphorylation of proteins can change the localization, binding partners, and activities of their targeted proteins (Lartigue, 2011). A bioinformatics tool, NetPhos 2.0, predicts the presence of phosphorylation sites on the MXD3 protein. This study will test if MXD3 is phosphorylated on these predicted sites in glioblastoma cells. Phosphatase will be used to remove potential phosphate groups on MXD3, and subsequent immunoblotting will be conducted to visualize any changes in migration. This information could be vital to understanding how the MXD3 protein is regulated within glioblastomas.

Effects of MFGM on Growth and Permeability of the Small Intestine

Ajeelon Boyd
Sponsor: Bo Lonnerdal, Ph.D.
Nutrition

This project aims to evaluate how the Milk Fat Globule Membrane (MFGM) effects the growth and permeability of the intestine. MFGM is a system of proteins embedded in phospholipid vesicles that deliver lipids to breast-fed infants. MFGM is believed to prevent various infections and enhance development. Infant formulas contain no MFGM. Part of the health effects of MFGM on the infant may be due to improved intestinal development. Sprague Dewey rats were bred to produce pups. The litters were culled to normal (N=10) or restricted-fed (R=16) and supplemented either with MFGM or nonfat skim milk (NFM). Supplementation was provided daily at 150 mg/kg body weight. Supplementation began on postnatal day (PD) 2 until PD-13 or PD-21(weaning). PD-13 pups were decapitated and samples of their intestine were collected. Body weight and small intestine length were recorded for each pup. The normal-fed MFGM group was, significantly, 3.38 centimeters longer than the normal-fed NFM group. Immunohistochemistry and Western blotting will be performed to determine the abundance of gap junction proteins within small intestine epithelial cells. Future work will determine the abundance of gap junction proteins and whether their expression correlates to an increase in the length and development of the intestine.

Threats to Survival and Recovery Strategies in Endangered Species Act (ESA) Recovery Plans

Kaili P. Brande
Sponsor: Marcel Holyoak, Ph.D.
Environmental Science & Policy

While several studies have evaluated the efficacy of various conservation techniques in aiding imperiled species, less research has focused on the frequency with which habitat restoration, in particular, is employed as a conservation strategy. I examined the prevalence with which habitat restoration, as a strategy to protect federally listed endangered birds and mammals, is used over other conservation strategies. Additionally, I examined the relationship between threats to survival and the recovery strategies listed in each plan. I focused on California to create a limited geographical scope and some uniformity of application of the Endangered Species Act (ESA). Prevalence and explanatory variables of interest were quantified from randomly-selected ESA Recovery Plans for Californian birds and mammals. Explanatory variables included year published, multi vs. single species plan, and level of imperilment (endangered vs. threatened). Results will likely prove useful in highlighting trends of ESA Plan implementation, identifying gaps where habitat restoration may be beneficial but is not utilized, and subsequently, offering guidance to management agencies about policy and funding allocations.

The Forthcoming Most Popular Sport in America May Surprise You

Andre C. Brown
Sponsor: Dwayne Shaffer, M.A.
Physical Education

Sports media and polls have shown that sport popularity has changed over the past few decades (Bennett, 2014) because there are more children playing sports, more professional teams, and more games being broadcast internationally (Reddy, 2015). There is a lack of research documenting specific changes across a variety of sports and how these changes may be associated with age. This study examines how sports popularity varies with age in the United States, and how this compares to other countries. Using multiple datasets, we examined the frequencies in which people listed specific sports as their favorite, and how these frequencies varied with age. Results from examining the popularity of sports in American children, American college students, American adults, Chinese adolescents, and Korean adults showed that some sports were more popular for specific age groups (e.g., basketball and soccer were more popular with younger individuals) and some of these patterns persisted across cultures while others didn't. For example, age was negatively associated with soccer in American Adults (β=-.14, $p<.05$) and Korean adults (β=-.17, $p<.05$). These results exemplify the change in sports interest and have implications for the rise of specific sports, particularly soccer, in years to come.

The Spectrum of Trauma

Laura F. Brown
Sponsor: Robin Hill, B.F.A.
Art & Art History

What is trauma? What does it feel like emotionally and/or physically? How does one process trauma or recover and heal from that experience? When we think of trauma what are the images that come to our minds? Through a series of interviews and using art as research to explore what trauma is subjectively, I present a series of paintings and drawings that are rendered from a dialogue with others about their experiences with trauma. Each will depict the emotional and mental response to trauma in a non-illustrative and non- narrative way. I think this study is important to our campus because emotional health is one of the eight dimensions of wellness according to the Student Health and Counseling Services. This study is currently in progress but the research methods demonstrate that trauma is on a spectrum from the little traumas of everyday life to repetitive or extreme single blows.

The Effect of Red Blotch Disease on the Composition and Development of Phenolic Compounds in Grape Berries During Ripening

Robert C. Bruce
Sponsor: Anita Oberholster, Ph.D.
Viticulture & Enology

Red Blotch is a recently identified disease caused by grapevine red blotch-associated virus (GRBaV). The disease has been found in 14 states in both red and white winegrape varieties. It is known that the disease causes a delay in ripening but little is known regarding the effects on berry phenolics, which are important for the quality of the resulting wine. The aim of this project is to determine how the disease effects phenolic composition (focusing mainly on tannins and anthocyanins) in grape skins and seeds. Cabernet Sauvignon berries from healthy and infected vines were sampled during the 2014 season, starting at veraison (start of sugar and color accumulation) until harvest. The skins and seeds of the grapes were analyzed using reverse-phase high-performance liquid chromatography (RP-HPLC) to determine potential differences in tannin and anthocyanin composition. Initial data from tannin analyses has shown that the disease has little effect on tannin concentrations in the skins and seeds of berries sampled at harvest and veraison. However, a 15% decrease in total anthocyanin concentration was observed for the diseased fruit at harvest. Quantifying the impact of Red Blotch disease can help grapegrowers and winemakers make informed decisions regarding the future of diseased grapevines.

Substrate Inhibition of *E. coli* CTP Synthetase is Additive With Inhibition by GTP and NADH

Christina Bui
Sponsor: Enoch Baldwin, Ph.D.
Molecular & Cellular Biology

Cytidine triphosphate synthetase (CTPS) is an important metabolic enzyme that catalyzes the last step of pyrimidine biosynthesis of cytosine-containing nucleotides. Limited CTPS activity may induce cellular growth-arrest. This enzyme is precisely controlled by concentrations of all four nucleotides and has recently been shown to become inhibited by its substrates. Substrate inhibition, which occurs in many other enzymes, is an important form of metabolic control; when excess substrate is present, enzyme activity may be reduced in an attempt to regulate downstream metabolite levels. To investigate the substrate regulation pattern, the inhibition curves for high concentrations of UTP and two inhibitors, GTP and NADH, were determined. The observed UTP inhibition curves appeared linear, a relationship similar to those of other known inhibitors. Further, UTP inhibition is additive with GTP and NADH inhibition. These results suggest that CTPS may be regulated by the total concentrations of its inhibitors and substrates. Perhaps, high concentrations of intracellular nucleotide metabolites may be a signal of metabolic stress, making it advantageous to reduce the concentration of a key metabolite like CTP. Uncovering CTPS's regulatory mechanism contributes to a broader understanding of cellular nucleotide homeostasis, and aids in the design of therapeutically-useful CTPS inhibitors.

The Role of DNA Polymerase 4 in Meiosis

Noelle B. Cabral
Sponsor: Wolf-Dietrich Heyer, Ph.D.
Microbiology & Molecular Genetics

All cells have to deal with insults to their genetic material. DNA Double strand breaks (DSB) are one of the most lethal DNA damage. Homologous recombination (HR) utilizes the sister chromatid as a homologous template for the repair of DSBs. HR is also critical for meiosis and accurate meiotic chromosome segregation by inducing crossovers between homologous chromosomes. In previous studies in yeast and mammals, it was noted that the expression of the non-essential DNA polymerase λ was highly induced during meiosis, suggesting that this DNA polymerase might play a role during meiosis. Biochemical analysis of the Polλ DNA polymerase activity showed an unsuual ability to extend mismatched primer-templates. We hypothesize that Polλ might be involved in DNA synthesis from mismtached primer-templates present during HR in meiosis. To test this, we perform meiotic tetrad analysis of two different strains of *Saccharomyces cerevisiae*, W303 and SK-1, that differ by .28-.36% in their genomes. We are interested in comparing the isogenic wild type and *pol4*Δ strains from hybrid (W303xSK1) or non-hybrid (SK1xSK1, W303xW303) backgrounds. A specific viability defect in *pol4*Δ hybrid strains *versus* non-hybrid or wild type strains would provide independent evidence for a role of Polλ in yeast meiosis.

Snowden/Doctorow: Alternate Realities of the Surveillance State

Alexis A. Caligiuri
Sponsor: Colin Milburn, Ph.D.
English

Edward Snowden, the legendary whistleblower who released a trove of secret documents from the National Security Agency to journalists in 2013, emerged from a veritable ecosystem of fandom. I argue that the conventions of participatory fiction structure every step of Snowden's journey. From the narrative framework that influenced Snowden's initial actions, to the interactive and game-like relationship between Snowden, the US government, and the press, to the response which engendered fan art and other sorts of appropriations, Edward Snowden's performance is recirculated through an environment of interactive speculative texts, which contributes to our understanding of the man and his message. This work integrates studies of media on a variety of platforms and interrogates the meanings and limits of global surveillance and digital revolution (or lack thereof). Through the lens of fandom studies, and from a fundamentally interdisciplinary perspective, this research investigates Edward Snowden not as a traitor or patriot— but as a fan.

PCB 95 Modulates Dendritic Arborization in Rat Hippocampal Neurons via Production of Reactive Oxygen Species

Tiani Calip
Sponsor: Pamela Lein, Ph.D.
Molecular Biosciences
School of Veterinary Medicine

Despite the polychlorinated biphenyl (PCB) production ban in the 1970s, these developmental neurotoxicants persist in the environment and pose potential risks to human health. Non-dioxin like (NDL) PCB 95 robustly sensitizes ryanodine receptors (RyR), resulting in increased intracellular calcium (Ca2+) and activation of Ca2+-dependent signaling pathways that promote dendritic growth in rat hippocampal neurons in a non-monotonic concentration-effect relationship. This raises significant questions regarding the biological mechanism(s) underlying the non-monotonic response. I hypothesize that the lack of dendrite-promoting activity at high levels of NDL PCBs is mediated by production of reactive oxygen species (ROS) that inhibit RyR activity. If this hypothesis is true, then dendritic response should be reversed by treatment with antioxidants (AO). However, dendritic growth at all concentrations of PCB 95 appeared to revert back to levels of control with AO treatment. This result does not support my original hypothesis, but rather suggests that ROS mediates PCB-induced growth. The next goal is to determine if PCB 95 increases ROS at high PCB 95 concentrations that do not trigger dendritic growth. My results so far indicate that I am able to detect ROS and lipid peroxidation in cultured hippocampal neurons and that AO protected against these effects.

Jane Austen's Assertion of How Civility Transcends Class

Kayla M. Camilli
Sponsor: Alessa Johns, Ph.D.
English

Jane Austen's novels reveal her interest in the concept of civility. In social interactions, civility encompasses a code of polite behavior that designates the courtesy owed to others. Austen considers true civility as more than manners; instead, it requires genteel behavior. However, her novels show how characters understand and practice civility differently. Those born into a high class—the gentry—often believe their status naturally gives them the qualities of civility. Consequently, they do not practice it as widely as lower-born characters, who must prove their gentility. I argue that Austen critiques this "natural" relationship between high class and civility; moreover, she illustrates how it allows characters to manipulate and use civility as a mask for selfish ends. In *Sense and Sensibility*, the unrefined Lucy Steele distorts civility to appear amiable and advance socially. Mr. Darcy, a landowner in *Pride and Prejudice*, also errs by assuming the right to be pleased, rather than accepting the obligation of pleasing someone lesser in status. Darcy's transformation, catalyzed by his love for the lower-born Elizabeth Bennet, proves one can learn civility. By complicating its traditional relationship with class, Austen censures shallow imitations and shows what true civility looks like.

Novel FRET Sensors for Detection of RhoA Signaling

Cindy C. Carvajal
Sponsor: Julie Bossuyt, D.V.M.,Ph.D.
Pharmacology
School of Medicine

Actin dynamics is an important component of the signaling arsenal of cells with established roles, not only in motility, but also in immune response and cancer. The Rho family of proteins, which includes RhoA, is a critical nexus in the signaling cascades leading to cytoskeletal reorganization. Thus far, assessments of RhoA signaling activation include western blotting of Rho protein phosphorylation state and GTPase activity assays. These destructive *in vitro* approaches do not offer real time dynamic readouts *in vivo*. The objective of this study is to characterize a novel RhoA FRET sensor for its ability to report RhoA activation and regulatory mechanisms impacting this pathway in living cells. We transfected the RhoA sensor and its insensitive variant into HEK293 cells. Using confocal microscopy, we then tracked FRET changes of the biosensor (i.e. Rho A activation) and downstream cytoskeletal effects with SiR actin in response to agonist stimulation. We find that the sensor permits spatiotemporally resolved measurements of RhoA activity. This represents a first step in using RhoA sensors to elucidate key mechanistic details of RhoA signaling in individual living cells.

Non-Homologous Associations During Meiosis Leads to Aneuploid Gametes and Embryonic Lethality

Christian Casas
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Chromosomal aneuploidy is a hallmark for spontaneous pregnancy loss and miscarriage. Conventionally, the occurrence of aneuploidy has been attributed to advancing maternal age and complications with normal female meiosis processes; however, our understanding of the factors responsible for chromosomal aneuploidy remains obscure. Here we studied a transgenic mouse model that exhibited a high incidence of stabilized non-homologous associations during meiosis, leading to high embryonic lethality. These non-homologous associations were stabilized by the formation of crossovers and presented as abnormal chiasmata structures during metaphase. Interestingly, the abnormal associations remained undetected by meiotic checkpoint machinery, as the sperm counts from these mice were very similar to those of age matched littermates. As a result, the aneuploid gametes were able to produce embryos, but the ultimate fate of the embryos varied depending on their inherited chromosome complement. Our investigation provided insight into another possible mechanism for enriching chromosomal aneuploidy in gametes, and, moreover, how these non-homologous associations were able to escape meiotic checkpoint machinery.

Examining the Mediating Effect of Teacher Ratings on Student Self-Efficacy and Achievement in Elementary and Middle School Science Across Gender

David Castallano-Ladd
Sponsor: Jacob Hibel, Ph.D.
Sociology

Previous research has attempted to elucidate the various mechanisms contributing to the underrepresentation of women in science, technology, engineering, and mathematics-related college majors and professions (STEM). While many of these earlier studies have focused on high school and college aged students, this study turns toward childhood and early adolescent education to explore one possible cause. Using a variety of quantitative strategies and data from the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K:99), this study examines the mediating effect of teacher ratings of students' cognitive abilities on student self-efficacy and achievement in elementary and middle school science subjects across gender. The underrepresentation of women in STEM-related college majors and professions contributes to the unequal influence of men in scientific research and development, and is a compounding source of lifetime economic inequality across gender. These factors and the increasing salience of STEM research and development underlie the importance of this study and related research.

High-Resolution Genetic Maps for Rainbow Trout Reveal Striking Differences in the Spatial Distribution of Recombination Between Sexes

Lucydalila Cedillo
Sponsor: Michael R. Miller, Ph.D.
Animal Science

Rainbow trout (*Oncorhynchus mykiss*) is an important species in aquaculture, sport fishing, and biomedical research. Despite widespread interest in studying *O. mykiss*, the current genome assembly primarily contains unordered contiguous sequences and scaffolds. The utility of current genetic maps for improving genome assembly is limited by recombination suppression in male meiosis and/or relatively low genetic marker density. Since females exhibit far less recombination suppression, we generated gynogenetic recombinant progeny that represent recombination events derived from female meiosis. We hypothesize that a combination of gynogenetically produced recombinant progeny and high-density genotyping will produce an improved genetic map to enhance the current reference genome assembly. To this end, we produced 550 recombinant progeny via gynogenesis and 85 progeny produced through androgenesis. We then used restriction-site associated DNA (RAD) sequencing to discover and genotype approximately 30,000 single nucleotide polymorphisms (SNPs) and constructed both female and male-derived genetic maps. The linkage maps constructed here provide critical genetic resources that can be applied to future conservation, aquaculture, and biomedical research. In addition, a comparison of corresponding linkage groups from both genetic maps suggests striking differences in the spatial distribution of recombination between sexes.

Suppression of Oculomotor Capture by Abrupt Onsets

Cristina Ceja
Sponsor: Steven J. Luck, Ph.D.
Psychology

Researchers have long debated whether salient-but-irrelevant stimuli can involuntarily "capture" visual attention. At the center of this debate are bright stimuli that appear suddenly, called *abrupt onsets*. Interestingly, there is little consensus whether abrupt onsets can actually capture attention in a fully automatic manner. On one hand, stimulus-driven theorists propose that abrupt onsets will always capture visual attention, no matter the individual's intentions. On the other hand, goal-driven theorists propose that the ultimate intention of an individual determines whether abrupt onsets can capture visual attention. Problematically, both theories make opposite predictions about when to expect capture in the real world. In this study, we test a hybrid account of attentional capture called *signal-suppression hypothesis*. No studies have previously assessed whether this account generalizes to abrupt onsets, which are largely considered a more potent class of salient distractors. We will have participants search for simple shapes, while ignoring an abrupt onset distractor. Critically, we will measure eye movements to determine whether attention was involuntarily drawn to the onset. Through this study, we hope to provide more data supporting a hybrid theory that includes both stimulus-driven and goal-driven theories to resolve this long-standing debate over how visual attention is captured.

Undocumented South Asian Indians in the United States

Deeptansh Chadha
Sponsor: Giovanni Peri, Ph.D.
Economics

The undocumented South Asian Indian population has been the fastest growing undocumented population in the United States and has grown from 30,000 in 1990 to about 450,000 in 2012, a 1400% increase. A significant number of undocumented South Asian Indian migrants overstay visas by choice or circumstance but a notable number of migrants also cross the border illegally and are smuggled into the US via Mexico or Belize. South Asian Indian immigrants and their native-born children make up 4% of the population and are the third largest undocumented immigrant group in the United States. The United States has seen a decrease in the overall Undocumented population in the past decade from 12.2 million in 2005 to 11 million in 2014. However, the population of Undocumented Indians has increased from 325,000 in 2005 to 450,000 in 2012, which is an increase of about 38.5%. Yet, little is known about this population on an academic or even political level.This project will examine the economic and social factors that shape this mass undocumented migration of Indian nationals to the United States relative to their documented counterparts and describe the pull factors that has led to this mass migration over the past two decades.

Yes, Meno Knowledge Is Possible

Vishal Chakraborty
Sponsor: Elaine Landry, Ph.D.
Philosophy

Philosophers of mathematics have often questioned the nature and significance of the theory of recollection as presented in the slave boy example in Plato's Meno. The theory of recollection postulates that the soul is immortal and has learned everything; seeking knowledge is nothing but the recollection of what the soul already knows. I will argue that recollection is a pedagogical technique used to respond to Meno's Paradox. It is neither a rhetorical device, nor is it part of Plato's dialectical method. Indeed, the problem posed by Plato's interlocutor Meno threatens any philosophical account of knowledge, including mathematical knowledge, and the teaching of such. Stated in brief, Meno's Paradox runs as follows: "...a man cannot search either for what he knows or for what he does not know...He cannot search for what he knows—since he knows it, there is no need to search—nor for what he does not know, for he does not know what to look for." I will show that if the theory of recollection is accepted as a pedagogical device, it solves the problem and thus allows for the possibility of knowledge, including mathematical knowledge.

Analysis of Monosaccharide Composition of Infant Foods by Triple Quadrupole Mass Spectrometry

Alan G. Chan
Sponsor: Carlito B. Lebrilla, Ph.D.
Chemistry

As infants transition from a purely milk diet to one consisting of solid food, the choice of carbohydrates they digest can have a significant effect on their growth and possibly the development of their gut microbiome. Unfortunately, the monosaccharide composition of many commonly consumed foods is yet to be established. This project aims to determine the free and total monosaccharide compositions of infant foods rich in carbohydrates. To achieve this, we utilized 3-methyl-1-phenyl-2-pyrazoline-5-one (PMP) labeling paired with dynamic Multiple Reaction Monitoring on a triple quadrupole mass spectrometer to quantify nine different monosaccharides in carbohydrate rich complimentary foods. These optimized methods of extraction and labeling of sugars allowed for the monosaccharides in several varieties of rice, oats, and corn cereals to be quantified at the femtomole level. Beyond this, the methods we have developed and results that we have attained can be expanded to look at the impact that different infant foods have on the gut microbiota. Our results also give insight into the specific nutritional profiles of food, which in turn can help guide the currently lacking infant weaning protocols.

Investigating the Role of Brahma (BRM) in Regulating the *Drosophila* Circadian Clock

Elizabeth Chan
Sponsor: Joanna C. Chiu, Ph.D.
Entomology & Nematology

As endogenous timekeeping mechanisms, circadian clocks have evolved to enable animals to maintain an approximate 24-hour period and govern various behavioral and physiological functions. The circadian clock is driven by a molecular oscillator that precisely controls and regulates the circadian transcriptome. Of current interest is the role of the chromatin-remodeling protein complex Brahma (BRM) in its epigenetic regulation of rhythmically expressed genes. Using *Drosophila* as an animal model, my project aims to uncover the function of BRM in clock regulation. Since BRM is known to be a regulator of the *Drosophila* circadian clock by interacting with a key clock protein, CLOCK (CLK), we hypothesize that BRM protein cycles in a circadian manner, regulating CLK-activated transcription at specific times of the day. To test this hypothesis, we will quantify BRM levels over the circadian day by Western blotting proteins extracted from wild type fly heads. To detect BRM, we generated a BRM polyclonal antibody—produced by expressing and purifying a fragment of BRM in recombinant bacteria, which was then injected as an antigen into rats. With the antibody in hand, we hope to understand how BRM modulates clock protein function through protein-protein interaction analysis and identification of new BRM coregulators.

Development of Personal Colorimetric Sensors for Chloropicrin (PS)

Grace Chan
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Once used as tear gas in World War I, Chloropicrin is now commonly used as a soil pesticide-fumigant and warning agent for odorless pesticides in US agriculture. Due to its toxicity and volatility, California Department of Pesticide Regulation (CDPR) has increased acute exposure levels to be 73 parts per billion over an eight-hour period. Thus, rapid, onsite, and accurate detections of very low levels of chloropicrin in air is necessary to protect workers, residents, and domestic animals from unwanted exposure to the chemical. This study applied colorimetric chemistry to develop color indicators. Methylene Blue, Potassium Indigotrisulfonate and Tetrasulfonic Acid, were examined to determine the amount of PS gas required for a color change. The indicators were first reacted with a reducing agent of 1% sodium carbonate and 0.5% sodium thiosulfonate before oxidation by gaseous PS. The study was repeated with different types of filter papers to improve PS sensitivity. As expected, lower concentrations of PS gas required more injections for color change to occur. Information gained from this study can be used to further development of simple, portable color sensors to warn workers of toxic PS contaminants in the atmosphere.

Evaluating Quality of Diabetes Health Intervention and Education Program in an Undergraduate Student-Run Free Medical Clinic

Melissa P. Chan
Sponsor: Luz Guerrero, M.D.
Internal Medicine
School of Medicine

The purpose of this project is to evaluate the quality of health services provided to patients at Bayanihan Clinic, one of the UCDMC-affiliated student-run clinics especially in the treatment of diabetes and its comorbidities in underserved populations. Bayanihan Clinic developed the Diabetes Empowerment Program to specifically address diabetes in its patient population. Through literature reviews, quantitative surveys, qualitative surveys, and electronic medical record abstraction, we will compare the patient outcomes, patient experiences, and processes of care of our clinic patients and Diabetes Empowerment Program patients to published literature regarding uninsured and underinsured populations. Abstracted data include HbA1c, fasting blood glucose, LDL, HDL, and BMI. This research will add to the current literature of knowledge regarding student-run clinics and diabetes intervention programs and validate the importance of quality improvement projects. We hope that from the research, we will be able to highlight patient experience, identify areas of improvement, and suggest solutions.

Quantitative Gait Analysis in a Female Mouse Model of Rett Syndrome

Alene Chang
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Rett syndrome (RTT) is a rare late onset neurological disorder caused by mutations in the methyl CpG binding protein 2 (MeCP2) gene. One of the major deficits in RTT is loss of purposeful hand movements and disruption of general motor function. Mouse models of RTT also show impaired motor function on several different types of motor tasks. The majority of research on mouse models of RTT has been done on male mutant mice, even though RTT occurs almost exclusively in females. Consequently, we examined the motor function of *Mecp2* heterozygous knockout female mice compared to wildtype littermates. We measured and analyzed differences in gait by quantifying differences in stride length, base width, and paw separation. *Mecp2* heterozygous females showed significant alterations in stride length and paw separation, indicating impairments in motor function in a female model of RTT. Future work could examine potential therapeutic strategies for reversing gait abnormalities in mouse models of RTT.

A Global Look at Maternal and Neonate Behavior in the Rat Maternal Immune Activation (MIA) Model

Christina Y. Chang
Sponsor: Melissa D. Bauman, Ph.D.
Psychiatry & Behavioral Sciences
School of Medicine

Women exposed to viral and bacterial infections during pregnancy have increased risks of giving birth to children later diagnosed with neurodevelopmental disorders, such as autism or schizophrenia. Preclinical research using rodent models identified maternal immune activation (MIA) as the key link between prenatal immune challenge and altered brain and behavioral development of the offspring. Maternal care also plays an important role in shaping behavioral development. It is plausible that MIA treatment compromises postpartum maternal care. Before evaluating effects of MIA treatment maternal behavior, pilot experiments in untreated control dams were conducted to quantify maternal and neonate behavior for post-natal days 4, 6, 8, 10 and 12. Observations of maternal pup retrieval behavior and neonate ultrasonic vocalizations (USVs) were collected using Observer XT 12 behavioral analysis and Avisoft Bioacoustic sound analysis programs. Preliminary data indicate that pups produce USVs when temporarily removed from the dams, peaking at PND 10, and that dams readily retrieve their pups and exhibit species-typical maternal care. These protocols and baseline data provide a framework for future studies of maternal and neonate behavior in the rat MIA model, thus contributing to our understanding the effects of prenatal immune challenge on brain and behavioral development of offspring.

Understanding Interactions Between Key Proteins in Plant Defense Mechanism

Jonghoon Chang
Sponsor: Savithramma Dinesh-Kumar, Ph.D.
Plant Biology

The world population has been gradually increasing, and so has the demand for food. This increasing demand for food along with the limited resources has put much emphasis on developing ingenious ways to modify plants so we can maximize their yield. Every year approximately 10% of crop yields are lost due to pathogenic diseases. Despite having sophisticated immune system against pathogens, plants still succumb to pathogenic diseases. Upon sensing the pathogen, plants turn on their self-defense mechanism through a cascade of kinase reactions, which culminates in defense against the invading pathogen. However, our understanding of how the initial sensing of a pathogen results in activation of the defense mechanism is yet incomplete. To get a molecular insight into how signal transduction relays signals, I used the yeast two-hybrid system or Y2H to probe the interactions of key proteins in the plant defense system. In addition, we have figured out specific amino acids that are involved in this signal pathway. I am currently working on site directed mutagenesis experiments which introduce mutations in specific amino acids of the key proteins. These experiments will elucidate physical and molecular meanings of the interactions of the key residues.

Validation of Direct-From-Tissue PCR for Microbiome Fingerprinting in Plants

Michelle Chang
Sponsor: Richard Jeannotte, Ph.D.
Plant Sciences

Plant growth-promoting microbial communities are viewed with ever-increasing importance toward the enhancement of crop production, and such communities can be characterized using traditional DNA extraction and PCR 'fingerprinting' techniques. However, traditional DNA extraction and subsequent PCR remains time-consuming and expensive. The goal of this project is to validate the use of PCR direct from tissue as an efficient, time- and cost-effective method to capture microbial diversity found on plant tissues and rhizospheric soils, in comparison to microbial diversity surveyed through pure DNA extracts. To screen for microbial diversity, we will amplify the gene encoding 16S ribosomal RNA directly from plant and soil samples using a KAPA3G Plant PCR Kit (Kapa Biosystems). 16S ribosomal RNA PCR will also be realized using DNA extracts from the same samples. We then will screen for quality and microbial diversity in the samples using the ARISA method in conjunction with the Agilent 2100 Bioanalyzer. We hypothesize that direct PCR from plant tissues is sufficient to obtain fingerprints of their microbial diversity comparable to PCR from pure DNA extracts. Validation of microbial fingerprinting via direct-from-tissue PCR would provide the scientific community with a rapid and cost-effective method to aid in the future research of host-microbe interactions.

Analyzing the ATPase Activities of HSP70 and Three Mutants

Rosy Chaudhary
Sponsor: Steven M. Theg, Ph.D.
Plant Biology

70kDa Heat Shock Proteins, termed HSP 70s, are found in the cytosol and in various compartments in eukaryotic organelles. They have three major domains: an ATP-binding domain, a substrate binding domain (SBD) and a C-terminal domain. Along with other co-chaperones, HSP70s prevent aggregation and misfolding of newly synthesized proteins, which are essential for cellular functions, by transient interaction with hydrophobic amino acids of the substrate at the SBD. The binding and subsequent release of the substrate requires ATP hydrolysis. It is believed that ADP-bound state of the enzyme promotes stable substrate binding by making conformational changes at the SBD. Conversely, the ATP-bound state displays relatively unstable substrate binding. In order to determine the ATPase activities of cytosolic HSP70 in plants and three mutant derivatives, HSP70-1, HSP70-2, and HSP70-3, a Malachite Green assay was performed in the presence of ATP and the model substrate NRLLLTG. Since the mutations are in the ATP-binding domain, we anticipated lower ATPase activity for the mutants compared to the wild type enzyme. Our preliminary experiments revealed activities of 19%, 25%, and 36% for HSP70-1, HSP70-2 and HSP70-3 respectively, compared to the wild type. This study may further the understanding of ATP hydrolysis in HSP70-substrate interactions.

The Middle East and North Africa in U.S Media Representations: An Analysis of the Term "Bedouin" in the New York Times (1930-1939)

Alexis R. Chavez
Sponsor: Suad Joseph, Ph.D.
Anthropology

The term "Bedouin" was used by the West in reference to nomadic groups in the Arabian and Syrian deserts. I examined 311 articles published from 1930 to 1939, and critically analyzed 101 relevant articles where the term "Bedouin" was used by New York Times correspondents. I discovered that Bedouin groups throughout the Arabian and Syrian deserts were represented as bloodthirsty, uncivilized, and anti-modern. I argue that this depiction of a violent and uncontrollable society was used to justify Western colonial acts that would allow it to materially and ideologically control the people of the East. This misrepresentation by the New York Times, which is considered to be a liberal news source, engraved into American society that the Bedouins were barbarous and illmannered. I suggest that such news media misrepresentation, which is persistent in the 21st century, served as an opportunity for the West to portray itself as heroic, modern, and advanced in order to depict portions of the East, specifically Bedouins, as backwards and barbaric. This research is part of an analytical project of the New York Times over 150 years conducted in Dr. Suad Joseph's lab.

Mathematical Modeling of a Synthetic Bacterial Consortium

Michael G. Chavez
Sponsor: Cheemeng Tan, Ph.D.
Biomedical Engineering

In vitro gene expression is an important biochemical tool for both basic research and biotechnology applications. To transcribe and translate genes without a cell, a solution of over thirty enzymes and associated proteins must be assembled in precise proportion. To this end, we have created a consortium of engineered Escherichia coli strains that together express all these proteins in a single culture. Through synthetic biology approaches, this consortium can be tuned to express the proteins in controllable proportions. To guide the design of the consortium, we create a mathematical model that predicts the protein output of each constituent in the consortium. The model, validated by mass spectrometry data, consists of a system of ODEs that describe the transcription and translation of each protein based off parameters such as the relative density of cell strains and gene copy number. The model is used to quantitatively engineer a consortium that produces an *in vitro* expression system with maximal expression rates. Furthermore, the model is used to guide the optimization of bacterial strains in the consortium. This model has broad implications for modeling synthetic biological devices, as well as understanding of bacterial population dynamics.

Shaped Experiences: Paintings as Systems of Visual Communication

Jose D. Chavez-Verduzco
Sponsor: James Housefield, Ph.D.
Design

The belief that paintings can be understood simply as acts of self-expression is false and problematic, yet it continues to be promoted in popular and educated analyses alike. By examining a broad selection of paintings, and the experiences they create, I aim to demonstrate how such works are in fact systems of visual communication. To best explore paintings as a system of visual communication, I collected a breath of social, political, and aesthetic works from online resources. Ten were then re-created as paintings for two reasons: (1) to bring together a collection of works from the past and present that would otherwise not occur in the context of a museum, and (2) to analyze how different visual characteristics come together to communicate an idea, and ultimately an experience. As I began to see how content was communicated across a variety of paintings, I came to understand more about how the differences in paint handling, color, and imagery functioned in an audience's experience of each work. More specifically, I have used the analytical study and recreation of artworks as tools to understand how each experience was created.

Characterization of a Troponin I Mouse Model of Restrictive Cardiomyopathy

Jenice X. Cheah
Sponsor: Aldrin V. Gomes, Ph.D.
Neurobiology, Physiology & Behavior

Cardiomyopathy is one of the leading causes of sudden cardiac death, especially in young adults. Of the different types of familial cardiomyopathies, studies on restrictive cardiomyopathy (RCM) are most limited. Diastolic dysfunction, poor ventricular filling, increased heart stiffness, and elevated end diastolic pressure are all characteristics of RCM. The prognosis for patients with RCM is poor and treatment for children often involves transplantation. The goal of this research is to investigate the signaling pathways involved in RCM using Tandem Mass Tag labelling and proteomics. By studying the relative amounts of proteins in transgenic RCM (R145W) and wild type models, we can identify signaling pathways that are downregulated and upregulated. The results from proteomics will be confirmed with Western blotting. I hypothesize that there will be significant differences in protein expression in a small but important group of signaling pathways. These results will help us understand the molecular changes occurring in RCM and provide further insight to investigate the pathways involved in RCM.

Cursor-to-Target Control From One Single Surface Electromyography Signal Recorded From a Head Muscle

Huanchun N. Chen
Sponsor: Sanjay S. Joshi, Ph.D.
Mechanical & Aerospace Engineering

Electromyography (EMG) is frequently utilized in Human-Computer Interfaces (HCI) for disabled individuals. In this study, we are investigating two-dimensional control of a computer cursor using selective firing of temporal muscles. Participants learn to control a cursor on a tablet through series of contractions and relaxations of the *temporalis* muscle, measured at one single muscle site. Subjects completed two two-hour long sessions of 288 trials. For each trial, one target of various sizes and distances from the origin (center of the screen) is presented. At the start of each trial, the cursor is rotating and forward movement is achieved when the muscle contracts. The cursor speed is dependent on the degree of muscle contraction, (ie. harder contraction will result in faster speed). The data are evaluated using a through-put measure that combines measures of movement time and target difficulty. We show that the results from this study using one recording site are comparable to previous studies using multiple sites. This device has immense application as an assistive technology for individuals with spinal cord injuries, who lack movement of their limbs. Through the control of head muscles, they may gain the ability to control technology such as computer, tablets, and power wheelchairs.

Alterations in Excitation-Contraction Coupling Proteins in a Porcine Ischemic Cardiomyopathy Model

Jiahui Chen
Sponsor: Julie Bossuyt, D.V.M.,Ph.D.
Pharmacology
School of Medicine

Ischemic Cardiomyopathy (ICM) is the most prevalent cause of heart failure (HF) which remains a critical medical and socioeconomic problem worldwide. Because of the growing burden of HF as the population ages, it is imperative to find more effective therapies. Large animal models which more closely recapitulate human HF pathophysiology are a crucial link in the translation of basic science discoveries into clinical applications. We received access to a novel porcine ICM model of HF. In this model, occlusion of the left anterior descending coronary artery resulted in progressive left ventricular dysfunction and development of HF over 3-6 months. Here we examine the changes in excitation-contraction coupling (ECC) proteins in the HF model that could contribute to the observed dysfunction. Tissue homogenates from left atria and ventricle (including peri-infarct and remote zones) were subjected to SDS-PAGE and western blotting. The blots were then probed for expression and phosphorylation levels of ECC proteins such as ryanodine receptors, sarcoplasmic reticulum Ca^{2+}-ATPase, phospholamban, Na^{+}/K^{+}-ATPase, K channels, L-type Ca^{2+} channels, and CaMKII. Our results are a first step in the characterization and evaluation of this porcine ICM model as a relevant human HF model.

Evaluating Serum Troponin as a Biomarker for Peri-Operative Risk

Maggie M. Chen
Sponsor: Neal W. Fleming, M.D.,Ph.D.
Anesthesiology & Pain Medicine
School of Medicine

Troponin T, I, and C are proteins found in cardiac and skeletal muscles. In diagnostic processes, they are used as biomarkers for detecting ischemic conditions such as myocardial damage associated with acute coronary syndrome (ACS) and non-ischemic conditions. It is established that clinically significant troponin elevations are associated with increased complications in surgical patients. Specifically, predictive values of non-diagnostic, pre-operative troponin elevations have not been previously assessed. We will determine predictive values of sub-clinical troponin elevations and evaluate if they are similar to predictive values of clinically significant troponin elevations. Factors associated with perioperative morbidity and mortality in surgical patients undergoing general anesthesia will be identified in the process. We will identify patients who present with elevated pre-operative serum troponin that is not associated with ACS and measured within three days of a non-cardiac surgical procedure. Using the propensity score matching, these patients will be matched with patients who have similar peri-operative risks and compared for their overall incidence of post-operative complications. By evaluating potential predictive values for measurable troponin elevation, we could improve peri-operative management and overall outcomes of surgical patents. Further, increasing our understanding of associated risks can potentially improve peri-operative care.

The Secular Stagnation Hypothesis: A Critical Review of the Literature

Mengyu Chen
Sponsor: Bagher Modjtahedi, Ph.D.
Economics

The Great Recession that started in 2007 officially ended in 2009. However, the growth in the national output measured by the real gross domestic product has been quite weak since then. This has resulted in stubbornly high unemployment rates for almost a decade. Some economists have argued that the last several decades can be characterized as an era of secular stagnation or permanent slump: an era of weak aggregate demand for goods and services that cannot be eliminated by the normal forces of a free market system. Several causes of this phenomenon have been proposed. These include such factors as debt overhang faced by U.S. households, slow pace of technological progress, low rates of population growth, and near-zero interest rates. Advocates of this hypothesis propose a heavy use of fiscal policy to boost aggregate demand. The opponents argue that there is not any fundamentally long-term problem with the economic system. This research critically reviews the current debate on the hypothesis of secular stagnation. It also attempts to shed light on the issue using macroeconomic data on the U.S. economy.

Prenatal Stress in Prairie Voles Alters Brain Plasticity and Socio-Emotional Receptors

Michelle Chen
Sponsor: Karen Bales, Ph.D.
Psychology

Exposure to stressful life events and environmental hardships may cause distress to expectant mothers, leading to prenatal stress (PS). PS studies have shown detrimental effects may harm the fetus's immune function and brain development. Despite these adverse effects, it has been proposed that PS may increase sensitivity to both positive and negative aspects of the environment. Thus, our team is studying possible negative and beneficial PS influence, depending on the quality of the early environment, on brain plasticity. We tested these hypotheses on prairie voles because they are socially monogamous and have similar social behaviors to humans and other mammalian species. The voles were grouped into conditions of prenatally stressed or control and cross-fostered to high or low quality early environments. The offspring were euthanized in adulthood, and their brains were removed to investigate densities of six receptors associated with socio-emotional behaviors: oxytocin, vasopressin, reelin, CRH1/2, and estrogen. Seventy-eight brains were collected and will be sliced on a cryostat for autoradiography and tracing to locate and quantify receptors. These upcoming results may demonstrate both negative and possibly positive neuroanatomical effects of PS and the early environment.

Can Infants Learn Better When Their Attention Is Guided by a Social Cue?

Brittney Chere
Sponsor: Susan Rivera, Ph.D.
Psychology

In any given situation, attention must be present in order for learning to occur. Previous research has shown that infants' attention can be guided by both non-social and social cues. In this study, a yellow rectangle (a "non-social" cue) and an arm with a pointing index finger (a "social" cue), both of the same relative shape and size, are used to compare the effects of the cue on the infants' ability to learn. Using an infrared eye tracker, 9-month-old infants' attention is directed to one of two patterns of shapes by either a rectangle or pointing arm. The infants are then shown patterns that are either consistent or inconsistent with the patterns they were directed toward. If infants show a preference for either the consistent or inconsistent pattern, we can conclude that they have learned. The hypothesis is that, due to their vast amount of social experience, infants will show more evidence of learning when cued by the social stimulus than by the non-social stimulus. Data collection is still ongoing, but infant gaze patterns during cueing and gaze patterns at test will be analyzed to compare the differences between conditions.

Can Soil Management Practices Be Used to Manage Insect Pests?

Andrea Cheung
Sponsor: Clare Casteel, Ph.D.
Plant Pathology

An increasing number of studies have demonstrated the ecological value of soil communities on their plant counterparts. For instance, exposure to specific strains of plant growth promoting rhizobacteria can enhance plant growth and induce plant resistance to pathogens. The objective of this study is to determine whether soil health and microbe composition also contributes to plant defenses against insect herbivores. To address this we collected soil from organic and conventional farm plots at UC Davis' Russell Ranch. Soil slurries were prepared from the collected soil and added to sterile soil. Plants were grown in sterile potting soil plus slurry treatments. Results indicated microbes from organic soil slurries increased plant resistance to aphids (*Myzus persicae*), but had no affect on Potato Virus Y susceptibility. Further, we determined levels of salicylic acid (SA), a phytohormone crucial for plant defense, is significantly higher in plants grown in organic soil. This suggests organic soil management practices can be used to increase plant resistance to insect herbivores and potentially reduce our dependency on pesticides.

Improving Sustainability in International Development

Malinda C. Cheung
Sponsor: Colleen E. Bronner, Ph.D.
Civil & Environmental Engineering

Engineers Without Borders (EWB) is a non-profit organization that partners with developing communities to create solutions for basic human needs. Complex challenges in infrastructure, health, and sanitation can often be solved with engineering solutions. Often, the difficulty lies in ensuring sustainability, especially in international locations. Our research focuses on improving sustainability in international development. By studying the results of our international projects, we gathered information on the efficacy and sustainability of our engineering solutions. We examine information from projects involving greywater reuse in Guatemala, sanitation in Uganda, and water distribution in Bolivia. A review of our projects yielded evidence that it is difficult to achieve sustainability without consistent monitoring of the system put in place. Our research is ongoing with more information needed on the effect of communication on project sustainability. The conclusions drawn from this research can lead to improvements of documentation methodology and project closure for international development projects.

Validation of the Vermicelli Task in Measuring Fine Motor Deficits for a Fragile X-Associated Tremor/Ataxia Syndrome Mouse Model

Alexander Chiang
Sponsor: Robert F. Berman, Ph.D.
Neurological Surgery
School of Medicine

The Fragile X-mental retardation gene (FMR1) has a CGG trinucleotide repeat segment in the 5' UTR that is between 5 and 54 in most individuals. Fragile X premutation carriers (PM) have an expanded CGG repeat of between 55 and 200, which puts them at risk of developing the late-onset neurodegenerative disorder Fragile X-associated Tremor/Ataxia Syndrome (FXTAS). We can model many of the characteristics of the PM and FXTAS, including the presence of intranuclear protein inclusions in neurons and astrocytes, as well as motor and cognitive impairments. However, motor impairments have been more difficult to model and require tests capable of accurately measuring fine motor skills. Therefore, we have adapted the "Vermicelli" test of fine forelimb motor skills for use in our mouse model of FXTAS. In this test mice are videotaped while consuming fixed lengths of vermicelli pasta. We then score the videos for motor performance of the forelimbs. Preliminary data show that the task can reliably quantify forelimb motor movements (Mean=16.33, Sd=4.58, C.V=25%), and we will be using this test to compare motor skills between our CGG mice and control mice.

Understanding Dvl1's Molecular Role in Robinow Syndrome

Shannon Choi
Sponsor: Henry Ho, Ph.D.
Cell Biology & Human Anatomy

Robinow syndrome (RS) is a rare genetic disorder that results in structural abnormalities, such as dwarfism, brachydactyly (shortening of fingers and toes), and distinct facial features. RS has been linked to mutations in the noncanonical Wnt5a-Ror2 signaling pathway. This pathway is essential for proper regulation of cell polarity and migration. Recent studies have found de novo frameshift mutations in a component of the pathway, the cytoplasmic phosphoprotein Dishevelled1 (Dvl1), that cause a dominant form of RS characterized by osteosclerosis, an abnormal hardening of bone. However, the molecular basis of the disease remains poorly understood. In an effort to elucidate the cellular mechanisms involved, our lab has conducted a proteomic screen to identify novel downstream effectors of the pathway, which include the kinesin Kif26b and the E3 ubiquitin ligase Pdzrn3. By creating the RS-causing Dvl1 mutation *in vitro* and comparing its activity to wild-type Dvl1 in various molecular and cell biology assays, we found that the mutant Dvl1 differentially affects Kif26b and Pdzrn3 regulation. We hypothesize that Kif26b and Pdzrn3 function in distinct branches of the Wnt5a-Ror pathway, and that the osteosclerotic form of RS is specifically caused by defects in Dvl1-Pdzrn3 signaling.

Who Should You Cite? Insights From Network Visualization of Scientific Articles

Fanny Chow
Sponsor: James Sharpnack, Ph.D.
Statistics

When writing a scientific article, researchers begin with a literature search to determine the scientific developments related to the topic of interest. A simple search of main keywords may suggest the most frequently cited articles but leave out articles most pertinent to the research question. In addressing this problem, we will develop an online tool to aide in the literature search process by analyzing data extracted from arxiv.org. Arxiv is an online archive of scientific articles from various disciplines, such as physics and statistics. This online tool will include automated data extraction tools and database management, embedding machine learning tools for an article recommender system, and web-based data visualization. By extracting article citation networks and co-authorship networks, we will make significant use of network visualization tools and integrate it with the article recommender system through recent machine learning tools. The prediction metrics and visualizations provided will hopefully enhance the literature search process.

Differentiation and Induction of THP-1 Monocytes to Examine Macrophage Subtypes M1 and M2 Interaction With Nanoparticles

Sarah Y. Chow
Sponsor: Angelique Y. Louie, Ph.D.
Biomedical Engineering

Atherosclerosis is the thickening of the artery wall due to the accumulation of macrophages and fatty materials. Vulnerable atherosclerotic plaques are susceptible to rupture and can lead to acute clinical events such as stroke or heart attack. Our group has developed sulfated dextran coated iron-oxide nanoparticles as imaging probes to target macrophages found in the vulnerable plaques and visualize them by magnetic resonance imaging and positron emission tomography in vivo. However, macrophages exist on a spectrum ranging from the extremes of pro-inflammatory to anti-inflammatory macrophages, respectively known as the M1 and M2 subtypes. In this work, we are interested in implementing macrophage induction and differentiation to examine how the spectrum of macrophages may interact differently with our imaging nanoprobes. We have been doing a literature search to develop a differentiation method of THP-1 monocytes by converting monocytes to macrophages with PMA (phorbol 12-myristate 13-acetate), followed by the addition of inducer molecules that upregulate and downregulate surface markers for primary identification of both subtype. Induced cells can later be analyzed by flow cytometry. This method of induction and differentiation is promising and the resulting M1 and M2 macrophage subtypes will be examined for their interaction with imaging nanoparticles.

Meta-Analysis of DNA Methylation Differences in Autism

Roy Chu
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Autism, affecting 1 in 68 children, is a developmental disorder typically diagnosed at the age of 3 by behavioral evaluation. To better understand the epigenetic effects of autism, studies using the Illumina HumanMethylation 450k BeadChip Array have compared DNA methylation differences between autism and control brain samples. One study found significant DNA methylation changes in the form of differentially methylated regions. Another study discovered dysregulated biological pathways, correlating areas responsible for immune functions with hypomethylated CpGs and areas related to synaptic membrane with hypermethylated CpGs. Determining the exact base pair locations in the epigenome that are differentially methylated would provide a much clearer picture of which genes in these pathways are being affected. Using array data from multiple studies and performing statistical analyses, I aimed to detect patterns in methylation differences on a single CpG basis between autism and control samples across multiple tissues. Aggregating data and conducting a meta-analysis provided statistical power in finding significant methylation differences at the base pair level. Determining which pathways affect tissues on an epigenetic level will deepen our understanding of the causes of autism, which will potentially lead to more effective preventative treatments for affected children.

Coupled Slosh Dynamics of Liquid-Filled Tanks in Micro-Gravity

Andrew M. Chuen
Sponsor: Nesrin Sarigul-Klijn, Ph.D.
Mechanical & Aerospace Engineering

This project seeks to understand the coupling between liquid slosh and the resulting wall stresses and deformations of the fluid container in micro-gravity. Typical space vehicles contain liquids that are usually in the form of propellant. When a free surface is created (i.e. when fuel is consumed), the liquid can move, or "slosh", inside its container and propagate waves. These waves can cause adverse effects such as resonance, resulting in catastrophic failure of the vehicle structure, or "jitter", which can change the vehicle's overall trajectory. Micro-gravity environments can particularly exacerbate such effects, as liquid behavior in such an environment is not well known. To study the effects of micro-gravity on slosh, a high-power model rocket is utilized to achieve low gravity environments where data of the liquid shape, structural stresses, and deformations is recorded. The liquid shape and deflection data will be compared to a 1g slosh test conducted on the ground and a computational model for reference. The data will verify the accuracy of the computational models, and any deviations from the model or slosh in 1g. Such research allows for better design and higher survivability of spacecraft.

Developing Blood Smear Analysis for Assigning White Sturgeon Ploidy Groups

Brigitte E. Clark
Sponsor: Andrea Schreier, Ph.D.
Animal Science

Sturgeon are an ancestral fish species that have existed for 200 million years. The white sturgeon is bred in captivity for caviar farming and conservation aquaculture. In aquaculture programs, a certain percentage of individuals produced have an abnormal number of chromosomes. While normal white sturgeon are octoploids (250 chromosomes; 8N), these abnormal spontaneous autopolyploid individuals have twelve genome copies (360 chromosomes; 12N). One hypothesis is egg ageing increases the likelihood of spontaneous autopolyploidy. The Schreier and Todgham labs conducted an experiment to test whether a time lag between ovulation and fertilization increased the rate of spontaneous autopolyploidy. My main objective was to determine if there are different proportions of the two ploidy groups (8N, 12N) in the different treatments for two white sturgeon families. I imaged and measured the erythrocyte long axis for 90 individuals from each ploidy group. Cell size increases as genome size increases so spontaneous autopolyploids have greater long axis measurements than normal fish. I will use these measurements to assign individuals into an 8N or 12N ploidy class. The findings of this study will help us to determine whether farmers and conservationists need to reduce the time between ovulation and fertilization to avoid producing spontaneous autopolyploids.

Ritual Murder in Colonial Ghana

Sequoya Collins
Sponsor: Corrie Decker, Ph.D.
History

On March 19, 1945 ten year old Ama Krabara's body washed up on the Ghanaian shore in Elmina, a coastal town in southern Ghana. It was later determined that she was dead for at least 24 hours. The coroner's report revealed that her body was severely mutilated: her upper and lower lips, both cheeks, both eyes, and her private parts and anus had been removed. The prosecutor discovered that Ama was a victim of medicine murder. Ama was a victim of medicine murder and her body parts were make a powerful medicinal potion. Although 20th century research elucidates that the amalgamation of indirect rule and customary law led to political instability and the prevalence of medicine murders in colonial Ghana, few studies specifically analyze the African child as an essential target in medicine murders. My research seeks to answer the following questions: Why were children chosen as the victims? Why was there not a moral outcry about the murder of a young child in the murder's colonial report and international newspapers? What does this medicine murder say about the role of the child in Ghanaian culture at this time?

Barriers to Children's Physical Activity in Two Rural Towns From California's Central Valley

José Condor
Sponsor: Banafsheh Sadeghi, M.D.,Ph.D.
Internal Medicine
School of Medicine

Childhood obesity places children at high risk for developing serious health issues. Although this epidemic affects about 18 percent of the American children, its prevalence is disproportionate across U.S. ethnic groups where Latino-Americans are highly affected. The Niños Sanos, Familia Sana is a multifaceted intervention to slow down the rate of BMI increase in young Mexican-origin children in two rural towns in Fresno County. The intervention consists of four major components: nutrition, physical activity, economic incentive and community art. The Centers for Disease Control and Prevention suggests that physical activity is necessary to maintain weight loss. This study focuses on the physical activity component, which is conducted in randomized controlled trials, and only the intervention group receives a structured physical activity program. For five consecutive weeks, the teachers from both communities were asked to self-report the physical activities, time spent and intensity level for each activity. They were also asked to identify barriers to the delivery of the physical activities. The relationship between self-reported physical activities and barriers to physical activities delivery is analyzed. The preliminary results suggest that the intervention group had fewer barriers to the delivery of physical activity and a higher overall physical activity.

More Than a Rock: Using Photogrammetry to Generate 3D Models of Lithic Artifacts

Marcos A. Contreras Ramirez
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

Archeological artifacts are often delicate and access to on object is necessarily limited to prevent damage. Recently 3D scanning has become increasingly popular to address this issue. One form of scanning, photogrammetry, uses photographs to measure the distance between objects and create high-quality 3D models. This method is inexpensive and less damaging compared to other forms of 3D scanning. The goal of my research is to create a teaching collection of lithic artifacts for use in the Anthropology Department at the University of California--Davis. To increase the utility of my work, I will investigate the accuracy of digital measurements taken from the 3D models, and will compare them to the measurements taken from the original artifact. This data, along with the creation of physical 3D printed models, will allow for quantitative analysis of these artifacts. These methods can prove to be the next best thing to having the original artifact and may allow researchers to collaborate when access to the artifact would otherwise be impossible.

Overcoming Student Distraction: How Cognitive Stress Affects Multitasking and Learning

Sarah A. Coon
Sponsor: Narine Yegiyan, Ph.D.
Communication

With the advent of mobile technology, off-task multitasking has become the norm in college classrooms. Previous research has shown that the prevalent choice of multitasking by students has a negative effect on their learning. Yet, little is known about factors that can discourage students from engaging in multitasking. The primary objective of this study was to address this question. Specifically, the effect of cognitive stress on students' goals and their decisions to multitask during lectures was explored. This study collected data on the multitasking activities of students during a pre-recorded lecture that was projected on a large classroom screen. Students were asked to attend to the lecture material under high and low stress conditions. In conditions where cognitive stress was high, the decision to multitask was expected to become less rewarding, incentivizing students to allocate cognitive resources toward relevant educational goals and away from off-task activities. In conditions where cognitive stress was low, students were expected to shift cognitive resources toward activities that met their personal goals (i.e. social interaction). The findings can help more efficiently control the amount of multitasking in classrooms by adjusting instructor teaching style, leading to improved learning outcomes.

Effects of Sex and Stress in Aversive Stimulus

Tiffany L. Copeland
Sponsor: Brian C. Trainor, Ph.D.
Psychology

Depression affects 14.8 million people every year and it is twice as likely to affect women as men. However few studies have been conducted to understand why females are more affected. The kappa opioid receptor (KOR) is the receptor in the brain that when activated by stress can lead to a dysphoric feeling that can lead to depression. Inhibiting this receptor could block the development of depression. Previous research by Al-Hasani et al. showed that specific neurons in the nucleus accumbens (NAc) are activated in response to aversive stimulus. We conducted studies in control and stressed, male and female California mice to test the effects of a KOR agonist on conditioned place aversion. The next step is to correlate behavioral data with activity in the NAc. We hypothesize that the ventral NAc will be activated if the mouse formed an aversion to the KOR agonist. This would be advantageous in comparing how stress, sex and KOR are involved in the development of depression.

Mutagenicity of Plug in Scented Oils

Chryslea Cosme
Sponsor: Norman Kado, Ph.D.
Environmental Toxicology

Plug-in Scented Oils are aerosol sprays that are plugged into an outlet to automatically disperse a set volume of oil at a set time interval. These sprays rely on a heating mechanism built in the plug system to disperse the scented oils into the room to mask undesired odor. The oils are complex mixtures of compounds and contribute to our indoor air environment. Very little information regarding the toxicity of the mixture(s) has been reported. An initial step in the evaluation of potential toxicity of this consumer product is to test the mutagenicity of these oils. The purpose of this research is to evaluate the mutagenicity of the complex mixture of the oils both as a liquid and as an aerosol. We use a Salmonella/microsome assay (with and without metabolic activation) in a number of tester strains. The procedure incorporates dose-response curves and the mutagenicity of the oils is reported.

In Response to AB 1826: How the Redirection of Food Waste From California's Landfills Will Alter Greenhouse Gas Emissions From Compost

Ben Croze
Sponsor: William Horwath, Ph.D.
Land, Air & Water Resources

Composting is a natural process where organic waste is grouped together to decompose at a rapid rate. A new mandate in California is ordering food waste from landfills to be redirected to composting facilities where green waste is the dominant feed source. However, further information is needed on how composting processes vary depending on the ratios of green waste and food waste during composting. Our experiments aim to determine how varying ratios will change green house gas emissions as well as a variety of other factors such as temperature, dissolved organic carbon, nitrate, and ammonium concentrations. By constructing two separate compost piles, one entirely green waste and one green and food waste, we can track these piles through their composting life cycles, determine their differences, and how they will impact the surrounding environment. As the organic waste in each pile decomposed over the course of three months, a variety of sampling techniques were used to record the changing parameters of the piles. This information will inform policy makers on food waste diversion potential as a soil amendment.

Lrig1 Regulation of Canonical Wnt Signaling in Triple Negative Breast Cancer

Amanda M. Cruz
Sponsor: Colleen Sweeney, Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

Despite dramatic improvements in screening, prevention and treatment of breast cancer over the last few decades, one in every eight women in the United States will be diagnosed with breast cancer during her lifetime. Up to 20% of these cases are classified as being "triple negative breast cancer" (TNBC), as they test negative for the three pathological hallmarks of other breast cancer subtypes and have a poor prognosis with a dramatic decrease in survival. In the past, studies have suggested aberrant activation of the canonical Wnt signaling pathway in TNBC. Upon activation, this pathway stabilizes a protein called β-Catenin, which activates expression of genes implicated in the growth and spread of cancer. As such, the proteins involved in the activation of the canonical Wnt signaling pathway may serve as molecular targets for TNBC. LRIG3 (Leucine reach repeat protein 3) is able to enhance canonical Wnt signaling through modulating transcriptional output during neural crest formation in *Xenopus laevis* and in mammalian cells. Studies from our laboratory have shown that a tumor suppressor, LRIG1 (Leucine rich repeat protein 1) and LRIG3 functionally oppose each other. Therefore, I hypothesize that LRIG1 inhibits cell growth mediated through canonical Wnt signaling.

Lethal and Sublethal Toxicity of Penoxsulam and Imazamox, in Comparison to Fluridone, on Delta Smelt (*Hypomesus transpacificus*)

Andrea Cruz
Sponsor: Swee Teh, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

The Department of Boating and Waterways has suggested the application of two new herbicides, Penoxsulam and Imazamox, to better control invasive aquatic vegetation in the Sacramento-San Joaquin Delta and surrounding tributaries. However, health effects of these herbicides on endangered Delta Smelt (*Hypomesus transpacificus*) is unknown. This study evaluated lethal and sublethal toxicity of these herbicides on Delta Smelt embryos. Additionally, lethality of Penoxsulam and Imazamox is compared to Fluridone, a currently used herbicide. Chemical toxicity tests were conducted on 1-2 days post-fertilization (dpf) embryos for 96-hour with a 90% water renewal at 48-hour interval. After 96-hour, embryos were rinsed and held in clean synthetic reconstituted culture water at 15°C with renewals every 48-hour until hatching at 11-12 dpf. At 12 dpf, hatching success was determined and hatched larvae were euthanized and their morphometry assessed. The 50% lethal concentrations (LC_{50}) of Penoxsulam and Imazamox could not be determined, suggesting an LC_{50} greater than 100 mg/L, whereas Fluridone had an LC_{50} = 326.6 mg/L. Moreover, morphological analysis revealed poorer conditions and embryo and larval deformities in fish exposed to Fluridone. In summary, Penoxsulam and Imazamox exposure did not significantly increase embryo mortality and deformity; therefore, they are considered less toxic than Fluridone.

Morphological Effects of Bulk and Nano Zinc Oxide Sunscreens on Developing Strongylocentrotus purpuratus Embryos

Brittany Cunningham
Sponsor: Gary N. Cherr, Ph.D.
Environmental Toxicology

The toxicity of zinc oxide (ZnO) sunscreen to Strongylocentrotus purpuratus was investigated. Increased use of sunscreens containing ZnO, both bulk and nano forms, raises the likelihood of ZnO being released into the environment. Though ZnO has been proven safe for humans, its effects on marine organisms are largely unknown. Previous studies have shown that ZnO causes developmental abnormalities in sea urchins. During this study a general trend of malformed embryos at low treatment concentrations, bell-shaped embryos at medium treatment concentrations, and animalized embryos at high treatment concentrations was seen. TPEN, a Zn^{2+} chelator, was also added to select treatments to see if binding Zn^{2+} from the sunscreen would reduce abnormality. For overall abnormality the EC50 values for nZnO were 0.03-0.06ppm. For sunscreen treatments of bulk ZnO and nZnO they were 0.0067-0.029ppm and $1.03x10^{-25}$- 0.0033ppm respectively. The morphology of bulk ZnO sunscreen treated embryos followed a similar pattern to that observed in nZnO with total abnormality at comparable Zn concentrations; however, nZnO sunscreen did not. This combined with the large amount of abnormality observed in treatments containing TPEN led to the conclusion that much of the abnormality observed can be attributed to other ingredients present in sunscreen.

Ocean Productivity Proxy by Sediment Trap Foraminifera Through Ba/Ca Ratio in Shell Composition

Haley Cynar
Sponsor: Ann Russell, Ph.D.
Earth & Planetary Sciences

Past climate conditions can be reconstructed from geochemical proxies that we measure in the present. One method of reconstructing the environmental oceanic conditions of the past is through measuring the shell composition in zooplankton shells collected from sediments laid down over time on the ocean floor. Researchers have suggested that Ba/Ca ratios in thermocline-dwelling non-spinose foraminifera covary with primary productivity. I will test this hypothesis by measuring Ba/Ca ratios in foraminifera from a transect of sediment traps spanning the equator along 140°W. Along the equator is a known region of upwelling that provides water enriched in nutrients to the surface. The Ba/Ca ratios in surface and thermocline-dwelling foraminifera shells will be used in conjunction with published water-column and sedimentary measures of productivity to compare the Ba/Ca in foraminifera from the productive equatorial upwelling zone with those from less productive regions north and south of the equator. These ratios will be determined by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) for high-resolution information from each shell.

Culturing and Characterization of Microorganisms in Feline Anal Glands

Petra Dahms
Sponsor: Jonathan Eisen, Ph.D.
Evolution & Ecology

Over the past few hundred years, cats have become part of the family household and are around us almost all the time, but little is actually known about the bacteria that live in their digestive and excretory systems. To mark their territory, attract mates, and develop a sense of comfort, cats spray chemicals known as pheromones that are produced by bacteria found in the cat's anal glands. Anal sac secretion samples have been collected from various types of cats, including feral cats, black-footed cats, pumas, and other large African cats. I have been culturing, sequencing, and identifying specific microbes in the anal glands that make these strong scents. Individual microbes I have identified were found to be connected to various human diseases and even acne. Challenges of this project included growing and maintaining bacterium in anaerobic chambers and finding an optimal culturing media for microorganisms that have never been studied. Further research will be comprised of trying different culturing media including anaerobic culture tubes and larger anaerobic chambers to characterize volatiles and identify more microbes. Through this research, I hope to learn more about specific microbes that may be affecting our daily lives through our household pets.

Reconstruction of Tyrosine Hydroxylase-Immunoreactive Retinal Neurons Through Novel Fixation Methods and the Deconvolution of Confocal Images

James Dang
Sponsor: Andrew Ishida, Ph.D.
Neurobiology, Physiology & Behavior

Dopamine is a modulatory neurotransmitter that is necessary for mediating circadian rhythmicity and light-adapted vision in the eye. The cells thought to be responsible for the release of dopamine in the retina are dopaminergic amacrine and interplexiform neurons, collectively known as tyrosine hydroxylase-immunoreactive (TH) cells. In order to reconstruct these neurons, we have created a novel retinal fixation method that minimizes common histological artifacts such as tissue shrinkage and the formation of bead-like swellings. We will then use confocal laser scanning microscopy to optically section and acquire images of stained cells. However, this process is not perfect, in that inherent limitations in the imaging system will cause convolution of the point spread function with the specimen, producing an optical aberration known as blur. Therefore, essential features of TH cells, such as their shape and dendritic arborizations, may not be accurately represented. I will test various deconvolution algorithms to reverse the blur and optimize the axial resolution of the image. With the proper combination of our methods in tissue preparation and image deconvolution, we can three-dimensionally reconstruct individual TH cells, providing the basis for future analysis of their dopaminergic properties and interactions with other cells in the retina.

Neutrino Detector Design for Directional Mid-Field Nuclear Nonproliferation

Daine L. Danielson
Sponsor: Robert C. Svoboda, Ph.D.
Physics

WATCHMAN is an application of neutrino physics to nuclear nonproliferation, under development in collaboration with Lawrence Livermore National Laboratory. Nuclear reactors are luminous (anti)neutrino sources, and nuclear weapons manufacture yields a characteristic neutrino flux signature distinct from that of energy production. The WATCHMAN neutrino detector will monitor for this neutrino flux signature to observe the clandestine manufacture of nuclear weapons. We design a neutrino detector to monitor a low-power weapons-manufacture reactor 5 km from a 1-20 kT neutrino detector volume, against a background neutrino flux from a high-power energy-producing reactor 25 km away (distances in the "mid-field" monitoring range). We simulate the detector characteristics required to distinguish the low-power signal from the high-power background by over three standard deviations after one month of monitoring. We vary detector geometry, materials, and positioning, to optimize neutrino sensitivity and reactor discrimination. In particular, to distinguish between these two simultaneous reactor fluxes, we investigate a detector design sensitive to the incident direction of each observed neutrino.

Differential Effects of Social-Defeat Stress in Paternal Behavior and Its Relationship to DRR1 Expression

Randy Davila
Sponsor: Brian C. Trainor, Ph.D.
Psychology

In mammals, parental behavior is necessary for the survival of offspring. However, most models describe changes in maternal behavior but less is known about how stress affects behavior by male parents. Therefore, in this study, we want to know how social defeat stress affects male parents and their behavior towards offspring. We discovered that there is an increase in frequency of pup retrieval and time huddling in stressed males when they rear their 2nd litter. There was also a shorter time latency for stressed males to attack a same sex conspecific stranger, although more data is needed to determine if there is a significant relationship. To explore the importance of neuropeptide receptors in the lateral septum, further studies will look into tumor suppressor gene down-regulated in renal cell carcinoma 1 (DRR1) mRNA in septal regions to determine whether there is a difference in expression. It has been proposed that this gene can affect synaptic plasticity and therefore may have a potential role in stress resilience. These data will provide important insights in to how psychosocial stress can affect parenting behavior.

Analysis of Artifacts From a Newly Discovered Site in the Mendocino National Forest, California.

Alycia C. Davis
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

This poster describes a newly found prehistoric site within the Mendocino National Forest in Northwestern California. FS#05-08-53-550 (commonly referred to as Big Scap.) consists of a dense chert and obsidian scatter surrounding the remains of a half-buried articulated bovid. The Big Scap. site was discovered during a surface survey as part of the 2015 UC Davis Archaeological Field School in conjunction with the US Forest Service. The site is located on a flat adjacent to a perennial spring surrounded by subalpine forest and chaparral at 5000 feet in elevation. This study was conducted to determine the age and of origin of raw materials used in flake production and knapping methods used during manufacture. X-Ray Fluorescence analyses was applied to obsidian artifacts, while chert debitage were examined through standard lithic flake attribute analysis and faunal identification was applied to the bovid remains. This study provides information concerning chronology, resource use, and site function.

Culturing and Characterization of the Microbes in Feline Anal Glands

Dana R. De Vries
Sponsor: Jonathan Eisen, Ph.D.
Medical Microbiology and Immunology

Recently, Michigan State University (MSU) linked symbiotic bacteria in hyena scent glands to animal behavior. Wild cats use volatile chemicals to communicate and MSU found these chemicals appear to be produced through fermentation from anaerobic bacteria. However, this correlation does not specifically identify bacterial species responsible for volatile production. The aim of this study is to determine which species produce volatile compounds in wild cat pheromones. Anal sacs of six wild South African cat species, including pumas, hyenas, and black footed cats, were sampled. Bacterial cultures of anal sac samples were used to identify living organisms. DNA was extracted from selected bacterial colonies, amplified through PCR, and sequenced. Thus far, two aerobic species and three anaerobic species were isolated. Moving forward, gas chromatography-mass spectrophotometry will be used to determine chemical compounds produced by metabolic pathways of isolated microbes, to link to volatile production. This data can be used to analyze how bacteria contribute to animal communication and marking behavior. Since six species of cats were sampled, three social and three solitary species, it can be determined if sociability affects which bacteria species are involved in communication and marking behavior.

Towards Enhanced Photochemical Water Splitting Through Bacteriorhodopsin/ TiO2 Sol-Gel Composite

Yue Deng
Sponsor: Marjorie Longo, Ph.D.
Chemical Engineering & Materials Science

Since Prof. Fujishima discovered the photocatalyst nature of titanium dioxide (TiO_2) in 1967, much research has been done on the UV light absorbing and water splitting phenomena of TiO_2. Previous research shows that combining Bacteriorhodopsin, which is a kind of protein that conducts protons and electrons under visible light, with TiO_2 increases the light band gap of TiO_2, which makes it also a photocatalyst under visible light. Ideally, this Bacteriorhodopsin/TiO_2 sol-gel composite can be used to produce hydrogen gas, an environmentally friendly fuel, from water using just solar energy, and it is believed to be one of the cleanest ways to store energy in usable form. Most published papers focus on TiO_2 nanoparticles, but TiO_2 sol-gel, which theoretically should bring higher reaction efficiency due to its structure, remains untouched. Hence, we developed a method to prepare titanium dioxide sol-gel without any usage of alcohol, and plan to add Bacteriorhodopsin into the sol-gel to then evaluate the reaction rate of water splitting through the Bacteriorhodopsin/TiO_2 sol-gel array. At current stage, we confirmed the photocatalyst behavior of our TiO_2 sol-gel under UV light though spectrum scans after dying the sol-gel with methylene blue.

Effect of Estrous Cycle Stage on Mammary Gland Morphology in Pigs

Amber Derpinghaus
Sponsor: Russell Hovey, Ph.D.
Animal Science

The mammary gland (MG) is important for animal production in that the milk it produces during lactation forms the cornerstone of animal growth. The MG develops during reproductive development prior to lactation in response to hormonal changes during the estrous cycle. Given the MGs of pigs are similar to the human breast, understanding how hormones affect MG development stands to provide insights regarding the origins of breast cancer. We hypothesize that the stage of the estrous cycle in female pigs will affect epithelial morphology similar to how stage of the menstrual cycle affects human breast morphology, where maximal epithelial proliferation occurs during the luteal phase. Mammary gland biopsy samples were taken from five nulliparous female pigs during each of the four stages of the estrous cycle and will be analyzed for cellular proliferation using immunohistochemical and histological analysis. In addition, changes in hormone levels will be evaluated using radioimmunoassays. These analyses will shed more light on MG development so that producers can better care for their animals and increase production efficiency, while also providing information about the factors regulating breast cancer progression.

Clinical Significance of Total Magnesium Concentration Versus Ionized Magnesium Significance

Bridget Devlin
Sponsor: Nam K. Tran, Ph.D.
Pathology & Laboratory Medicine
School of Medicine

Magnesium (Mg) is a cofactor in over 300 biochemical enzyme reactions in the body and is necessary for the biological activation of ATP. It is extremely important for hospitals to monitor patient Mg levels because hypomagnesemia can cause severe illness and eventually patient death if not treated. Conversely, hypermagnesemia can lead to fatigue and prolong hospital stay. Failure to properly treat these conditions can lead to an extended hospital stay and poor patient outcome. Approximately 1% of the body's Mg is found in blood serum and current practice is to test patient total (ionized, non-ionized, and protein bound) magnesium (tMg) levels in plasma. It is believed that tMg measurements under-estimate Mg status and place patients at risk for excessive Mg repletion. In contrast, ionized Mg (Mg++) is the biologically active form and may better represent usable Mg status. In addition, ionized Mg is available from only one manufacturer which makes is less common than the more readily available tMg. We hypothesize Mg++ measurements are superior to tMg and enhances outcomes and could be used to optimize Mg repletion in critically ill patients.

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Timothy Diep
Sponsor: Nolan Zane, Ph.D.
Psychology

Psychotherapy, originally from Europe, was developed to treat middle and upper class European clients. As Western countries become more culturally diverse, however, its applicability for certain populations has come into question. This may be due to psychotherapy being optimally effective only when clients openly self-disclose their psychological problems and issues to their therapist (Stricker & Fisher, 1990). Self-disclosure tendencies may differ based on socioeconomic (Consedine, Sabag-Cohen, & Krivoshekova, 2007), gender (Papini et al., 1990), and ethnic variations (Chen & Guo-Ming, 1992). Thus, for certain populations, psychotherapy may be only marginally effective. The current study examines the relationship between ethnic background, socioeconomic status, and gender on self-disclosure among 366 young adults. Our findings indicated that males, Whites, and those from higher socioeconomic backgrounds were more likely to self-disclose than females, Asians, and those from lower socioeconomic backgrounds, respectively. Future research should explore alternative treatment approaches that can enhance self-disclosure in ways that are more culturally appropriate in order to increase therapy effectiveness in these groups.

Investigation of the Effects of Intranasal Vasopressin Administration on Behavior in the Prairie Vole

Janeet Dhauna
Sponsor: Adele M. Seelke, Ph.D.
Psychology

The study of social interactions and related psychological disorders has quickly become a popular field of research. Of the many hormones and mechanisms under scrutiny, a protein hormone called Arginine Vasopressin has remained understudied for its correlation to social behavior. Currently, medical trials are investigating the presence of a significant link between low Vasopressin levels and autism. Unlike Vasopressin, a similar hormone called oxytocin has been a popular topic of study for researchers working both with humans and animal models. Our research works to provide insight into the effects of chronic Vasopressin treatments, specifically in a monogamous rodent called the prairie vole. For seven consecutive days, from 15-21 days old, the prairie voles receive two daily intranasal vasopressin treatments. Treatments consist of three different concentrations of Vasopressin (Low: 0.1 IU/kg, Medium: 1.0 IU/kg, High: 10.0 IU/kg) and a Saline control. At 22 days old, the animals are put through three sequential open field tests as a measure of anxiety and the subjects' affinity for novel objects. Particular behavior scored for includes fecal droppings, location in testing field, and time spent near novel objects. Our study will serve as a reference of the effects of Vasopressin on social behavior.

Investigating Rbfox3 Sufficiency for SNORD116 RNA Cloud Formation

Gayathri Dileep
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Prader-Willi syndrome (PWS) is a complex neurodevelopmental disorder caused by the absence of a paternal gene, normally an individual's only active copy of this gene, on chromosome 15. The SNORD116 gene in this region produces RNA, which forms a cloud in the nucleus of neurons. RNA needs to be processed, or spliced, in order to form an RNA cloud. We hypothesize that this process requires the protein Rbfox3, which is only found in neurons. In non-neuronal cells, however, these RNA clouds do not form, potentially due to the absence of Rbfox3. Thus far, Rbfox3 has been shown to be necessary in the formation of RNA clouds, since the clouds do not form once it is taken out of neurons. We will investigate whether Rbfox3 is also sufficient for the formation of RNA clouds, by testing if the addition of Rbfox3 results in RNA cloud formation in cells where they do not normally form. For this experiment, we will insert an active form of Rbfox3 in non-neural brain cells called astrocytes, in which RNA clouds do not usually form. If Rbfox3 is sufficient for the formation of RNA clouds, we should later find RNA clouds in the nucleus of these astrocytes.

Millennials and Political Messages on Social Media: What Types of Cues Work Best for Politicians?

Hannah Dillman
Sponsor: Amber Boydstun, Ph.D.
Political Science

The number of Facebook users worldwide recently hit 1 billion. And as the use of social networking sites has skyrocketed in this and other ways, politicians have been quick to adopt a social media presence. One demographic group especially active on social media is the group of young adults classified as "millennials" (those born between 1980 and 1997). Millennials have become a major part of the electorate that politicians must focus on in order to win at the ballot box. We know that social media can be used to galvanize these voters, yet little research has been done to study exactly how. I use an experiment to test three hypotheses regarding different types of social media posts—infographics, humorous posts, and full-length articles (compared to a headline-only control)—across three dependent variables—positive feelings toward a politician, potential of a future vote, and trust—to identify if, and how, politicians can use social media to appeal to millennials. I find statistically significant evidence that millennials' feelings towards a politician and their potential future voting choice (although not their trust in the politician) can be affected by the type of post that is used.

Kinetic Studies of Substrate Inhibition of *E. coli* CTP Synthetase (CTPS) and Its Interations With Other Inhibitors

Jacob J. Dinis
Sponsor: Enoch Baldwin, Ph.D.
Molecular & Cellular Biology

CTPS enzymes produce CTP, often the limiting nucleotide for cell growth and function. CTPS enzymes are highly regulated by a multitude of metabolic inputs, including feedback inhibition by CTP which sets the upper limit for its cellular concentration. CTP further induces the formation of inhibited CTPS filaments which serve to provide a rapid activity switch. Both UTP and ATP are nucleotides necessary for the production of CTP, but I demonstrated that they also inhibit CTPS at higher concentrations. Down regulation of CTPS by high concentrations of substrates ATP and UTP and product CTP are additive. Both the wild-type enzyme and a mutant unable to form filaments were inhibited to the same extent by high concentrations of UTP, revealing that the mechanism is not directly related to filament formation. This result suggests that CTPS integrates the total nucleotide triphosphate concentration in determining its output. These discoveries add to the already complex and multifaceted regulation of CTPS.

Conversation Changer: Reporting on Sexual Assault

Melissa E. Dittrich
Sponsor: Kimberlee Shauman, Ph.D.
Sociology

Media coverage of sexual assaults on college campuses has increased dramatically since 2014, as reports of assaults have also increased. The issue has reached the attention and concern of some state governments, with California and New York passing 'affirmative consent' laws that aim to educate students about sex and redefine consent as a firm and enthusiastic yes rather than saying no. As these states begin to address sexual assaults on college campuses, has there also been a shift in public attitude toward the issue? By using a sample of articles and columns in the *Los Angeles Times* and *New York Times* from 2005 to 2015, my research will investigate if previous trends in reporting on sexual assault cases, including rape myths and lack of focus on the victims, have continued in print media even as new laws and a wider discussion about consent and sexual assault take place. These prominent news sources are ideal in that their reporting is based in the two states that have started conversations about sexual assault through passing affirmative consent laws, and can therefore reflect cultural changes in attitudes toward victim blaming and sexual assault through what is emphasized in reporting.

Intergenerational Engagement: Crossing Generational Divides via Intentional Interaction

Juliette N. Diveley
Sponsor: Lisa S. Miller, Ph.D.
Human Ecology

Modern, western countries have become increasingly age segregated, which may contribute to unnecessary isolation of older adults and negative age stereotypes. "Intergenerational engagement," purposeful and intentional interaction that spans generational divides, could benefit the wellbeing of older adults as well as reduce age stereotypes. However, research examining the effects of intergenerational engagement on older adult's wellbeing is limited. Furthermore, very little is known about the types of programs in existence, particularly within assisted living facilities—locations with the most homogeneous age distribution. The present study investigates intergenerational programs in assisted living facilities as well as attitudes of facility directors towards these types of programs. Ten assisted living directors in the Davis-Sacramento area will be interviewed to determine programs available and attitudes toward implementing a few example programs. Their responses will be coded and analyzed to provide valuable information that may help foster future programs and lead to research that examines the benefits of fostering intergenerational relationships

The Baby-Associated Built Environment (BABE) Microbiome Project

Leela Dixit
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Before birth, infants are nearly sterile but are immediately exposed to a wide array of environmental microbes upon birth. One microbial group common to the infant gastrointestinal tract, bifidobacteria, may assist in the development of the infant immune system. Bifidobacteria are less prevalent in infants in developed countries, possibly due to differences in transmission to infants. The Baby-Associated Built Environment (BABE) Microbiome Project investigates this possibility in three ways: analysis of the microbiota of manmade environments that might mediate transmission of bifidobacteria, studies of the survival of a model bifidobacteria (*Bifidobacterium longum* subsp. *infantis*) outside the gastrointestinal tract, and surveys of the gut microbiota of infants with different levels of social exposure. Results indicate that bifidobacteria can be found in the built environment, where they may survive for up to two weeks. These results support the hypothesis that bifidobacteria are transmissible via the built environment, however, there is no clear answer yet as to what the predominant source of these extracorporeal bacteria is. Further study may yield greater insight into the impact of differing levels of exposure to environmental bifidobacteria on the infant gut microbiome.

Pollinator Rewards of *S. breweri vs. S. hesperidis*

Jonathan P. Doan
Sponsor: Sharon Y. Strauss, Ph.D.
Evolution & Ecology

This research involves the study of pollinator preferences between *S. breweri* and *S. hesperidis* around the McLaughlin Reserve. In detail, the research examines nectar reward as a possible deciding factor for the preferences of *Bombus vosnesenskii*, a bee that prefers *S. breweri* more than *S. hesperidis*at sympatric sites. Nectar content was compared in terms of sugar concentration, brix, between zones of allopatry and sympatry for *S. breweri* and *S. hesperidis*. The measurements of *S. breweri* and *S. hesperidis* were taken within a common garden in the form of five replicates and included an additional measure for nectar content accuracy. The samples were then organized by the locations of the plants. While in locations of allopatry the nectar content of both species was similar, in zones of sympatry, *S. breweri*i showed higher sugar content within its flowers. The significance of *S. breweri*'s higher sugar content at sympatric sites suggests a possible prezygotic reproductive isolation factor. Pollinator preferences are one form of reproductive isolation and understanding *Bombus vosnesenskii*'s pollinator preferences provides additional insight for the speciation of Jewelflowers within the *Streptanthus* genus.

Post-Humanist Futures After Fukushima: Globalist, Robotic Takeover of Japan's Sovereignty

Leslie L. Do
Sponsor: Darrell Y. Hamamoto, Ph.D.
Asian American Studies

With regards to Japan socially merging humans and robots after the Fukushima Daiichi nuclear disaster, its latest robotic creations are rebranding Japan's national image as the center of post-humanism. Although androids can save lives during Japan's future disasters and serve as caretakers for the growing elderly population, globalists can use both humanistic purposes as distractions to hide the weaponization of robots against the Japanese masses. Applying Hamamoto's New World Order theory, I argue that globalist social engineers can program militaristic robots to socially control the masses, to track political dissenters and frequently enter their information into surveillance databases, and to act as agents of population reduction, which expands the globalists' population control of Japan. Therefore, why did globalists chose Japan to be the national image of post-humanism? What globalist foundations, globalist-controlled institutions, and central bankers are funding the production of Japan's robotic projects? What are the globalists' intentions and ulterior agendas behind funding these projects? By utilizing secondary sources and analyzing interviews of Japan's researchers in artificial intelligence, I will determine if Japan's current robotic projects are implicated in the globalists' covert takeover of Japan's sovereignty.

Design of a Multiplexor Circuit for Efficient Use of Detector Electronics in PET Scanner

Yimeng Dou
Sponsor: Ramsey D. Badawi, Ph.D.
Radiology
School of Medicine

Currently more clinical and research applications adopt Positron Emission Tomography. To improve the resolution, the hybrid detector, containing position sensitive photomultiplier tubes, LSO crystal array, and the avalanche photodiodes have been developed at UC Davis. The new design uses APD to decode the space depth of radiation interaction. However, the extra channel of APD gives difficulty to researchers. PSPMT provides two anodes each to produce a separate x and y position-coding signal. The charge division readout channel will be X^+, X^-, Y^+, and Y^- for each detector. The APD gives relative depth Z. So one hybrid dual ended detector module provides 5 output signals. For PET system to detect one annihilation event of two gamma photons, two detectors are needed, and then there will be a total of ten output signals. Better PET scanners have more detectors. Data acquisition systems have a limited number of channels; in order to implement more detectors, researchers need more DAQ boards. The multiplexer gives a cheaper solution than purchasing DAQ boards. The setup uses C-12 PSPMT and Cardinal DAQ system, and the ^{68}Ge and ^{23}Na are used as source. The up to date result of flood histogram shows the multiplexer is functioning as intended.

Transgenic Luciferase Reporters in *Xenopus laevis* Function Throughout Development

Amy T. Du
Sponsor: J. David Furlow, Ph.D.
Neurobiology, Physiology & Behavior

Thyroid hormone (TH) plays an essential role in vertebrate development, especially in the human central nervous system. In *Xenopus laevis*, the African clawed frog, TH and its receptors (TRs) are required to initiate and maintain metamorphosis of tadpoles to frogs, making *Xenopus* a good model system for assessing disruption of TH function during development. Transgenic frogs bearing a TH response element controlled luciferase reporter gene have been used at one-week post fertilization for screening compounds for disruption of TH signaling. Here we assayed whether later developmental times remained responsive to TH in multiple tissues associated with metamorphic changes. We found that luciferase activity is functional and TH responsive with results showing high TH sensitivity in the hind limbs, followed by brain and lastly, tail. This demonstrates the ability of luciferase to be an accurate reporter gene in tissues with different cell fates, as well as being very quantitative and fast. We anticipate our results to increase the use of luciferase as a dependable reporter gene on external chemicals for future research.

The Use of Replicative Studies in Understanding Material Selection Strategies for Fishhook Production on San Nicolas Island, CA

Lauren J. Duckworth
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

Single piece shell fish hooks revolutionized the late Holocene fishery of coastal and insular Southern California. Over the past 30 years of archaeological research on the Channel Islands it has been noted that assemblages from the northern islands are dominated by hooks produced from California mussel, while assemblages from the southern islands are dominated by hooks made from red abalone. Conventional approaches aimed at addressing these differences typically site cultural preferences, ecology, and resource depression to explain this variation. Sea surface temperature data indicate differences in innertidal and subtidal productivity between the northern and southern islands which may help explain why red abalone hooks appear less frequently on the northern chain. However, California mussel is vastly more abundant than red abalone on the northern and southern chain of the Channel Islands and previous research fails to adequately explain the relative dearth of mussel fishhooks on the southern islands, especially San Nicolas Island. This poster uses a technological approach and experimentally derived data to further address why Chumash and Gabrielino craftspeople produced fishhooks from disparate shellfish species. Special attention is paid to methods of production, efficiency, and lithic raw material constraints.

The Use of Replicative Studies in Understanding Material Selection Strategies for Fishhook Production on San Nicolas Island, CA

Samantha Dunham
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

Single piece shell fish hooks revolutionized the late Holocene fishery of coastal and insular Southern California. Over the past 30 years of archaeological research on the Channel Islands it has been noted that assemblages from the northern islands are dominated by hooks produced from California mussel, while assemblages from the southern islands are dominated by hooks made from red abalone. Conventional approaches aimed at addressing these differences typically site cultural preferences, ecology, and resource depression to explain this variation. Sea surface temperature data indicate differences in innertidal and subtidal productivity between the northern and southern islands which may help explain why red abalone hooks appear less frequently on the northern chain. However, California mussel is vastly more abundant than red abalone on the northern and southern chain of the Channel Islands and previous research fails to adequately explain the relative dearth of mussel fishhooks on the southern islands, especially San Nicolas Island. This poster uses a technological approach and experimentally derived data to further address why Chumash and Gabrielino craftspeople produced fishhooks from disparate shellfish species. Special attention is paid to methods of production, efficiency, and lithic raw material constraints.

The Role of Gαi's Interactions With RGS and GoLoco Proteins in Neutrophil Chemotaxis

Kavita Dutta
Sponsor: Sean R. Collins, Ph.D.
Microbiology & Molecular Genetics

Neutrophils use chemotaxis, directed movement along chemical gradients, to migrate to infections. In chemotaxis, transmembrane G-protein coupled receptors bind chemoattractants, activating Gi family heterotrimeric G-proteins. Gαi has a recently discovered role in cell steering; Gαi knockdown caused directionality defects in our chemotaxis assay. We hypothesize that non-receptor regulators of Gαi contribute to maintaining accurate directional sensing in neutrophils. We will investigate two Gαi mutations that block interactions with RGS-proteins and GoLoco-proteins, two non-receptor regulators. RGS-proteins promote the conversion of Gαi-GTP to Gαi-GDP, causing heterotrimer reformation. Without Gαi-RGS interaction, we expect increased neutrophil motility, but reduced directional sensing. GoLoco proteins sequester Gαi-GDP at the plasma membrane. We hypothesize that Gαi-GDP sequestration could reduce heterotrimer reformation, or could serve as an independent signaling pathway. Both mutations have been cloned and are awaiting stable integration into neutrophil-like (PLB-985) cell genomes via lentiviral vectors. The RGS and GoLoco mutants also have a pertussis toxin insensitivity mutation, allowing us to silence endogenous Gαi signaling with toxin application. PLB-985 cells expressing RGS and GoLoco mutations will be quantitatively assessed for directionality vs motility defects using our fluorescent chemotaxis assay.

Visual Search for Emotional Expressions and Directional Bias in the Visual Field in the First Year of Life

Ila Dwivedi
Sponsor: Lisa M. Oakes, Ph.D.
Psychology

During the first year of life, infants encounter diverse emotional stimuli, such as facial expressions. Theoretically, it is adaptive for infants to pay attention to all such emotional cues. In adults, there is a right hemisphere advantage in emotional processing, which results in a left visual field bias (Alpers, 2008). It is therefore apt to ask whether this directional bias in the visual field also exists in infants, and whether this bias is strengthened by the presence of salient emotional stimuli in the left visual field. In the lab, we are currently investigating the effects of emotional information and field of view on visual attention in four to eight month old infants. In this ongoing study, we present infants with arrays of two, four, or six faces. In each array, one face exhibits a happy or sad expression, while the others remain neutral. We will analyze the proportion looking time at salient faces, and the directional bias of initial looks in the visual field using newly defined analytical parameters. Based on evidence that initial preference for emotional expressions increases with age, it is possible that this left visual field bias will emerge with age in the first year of life.

How Federal Nutrition Programs Influence Dietary Behaviors in Rural, Food Insecure Households

Esther P. Ebuehi
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

Families from rural communities in the United States tend to have limited access to nutritionally adequate foods (Bauer et al., 2014). These "food insecure" families are often frequent consumers of cheap, energy-dense foods like fast food (Bruening et al., 2012; Nackers & Applehans, 2013), which can contribute to poor health outcomes (Jaworowska et al., 2013; Kirkpatrick et al., 2014). The Supplemental Nutrition Assistance Program (SNAP), designed in accordance with the Dietary Guidelines for Americans, serves to equip food insecure families with increased access to healthy food in their area (Yaktine & Caswell, 2014). However, there is a lack of research assessing how federal nutrition programs influence dietary behaviors in rural, food insecure households. The current study will use data from the Rural Families Speak study (N=415) to evaluate whether SNAP moderates the association between food insecurity and dietary behaviors. To examine this association, I will use multiple regression analyses. Food insecurity was measured using a six-item short form of the USDA Food Security Module; SNAP usage and fast food consumption were assessed through parent report. I hypothesize that food insecure families participating in SNAP will report a lower consumption of fast food than families that are food secure.

Cdc48 Hexameric Segregase Regulation of Recombination in Meiosis

Jesus Edquilang
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Meiosis is the process by which a cell undergoes two rounds of division to form haploid gametes. Errors that occur during meiosis can cause genetic disorders such as Down Syndrome and Alzheimer's disease. In order to prevent these errors, meiosis is regulated by hundreds of protein interactions, but the precise mechanisms of some of these regulatory interactions and the proteins involved are not fully defined. Using the model organism Budding Yeast, Saccharomyces cerevisiae, our lab is investigating the potential roles of Cdc48, an ATPase Associated with diverse cellular Activities (AAA+), in regulating meiosis. During mitosis, Cdc48 interacts with one of its cofactors, Ufd1, to regulate recombination by recognizing and segregating pro-recombination proteins. The role that Cdc48 plays in meiosis is fully unknown. Previous results using mutant strains that lack Cdc48 expression during meiosis have indicated that Cdc48 plays a role in negatively regulating recombination. We aim to further investigate its function by producing Cdc48 complex mutant strains that carry genetic markers located on three chromosomes of different sizes. Tetrad analysis will then be carried out on the mutant spores to calculate their recombinant frequency. The timing and efficiency of the mutants' meiotic divisions will also be examined at several stages.

The Environmental Policy and Pollution Intensity Impacts of International Trade

Sean Ehrlich
Sponsor: Giovanni Peri, Ph.D.
Economics

Many theories aim to explain the relationship between international trade and environmental quality. These theories are often conflicting and fail to answer the interesting question of whether trade openness causes complete environmental degradation or eventually leads to environmental quality improvement. The first part of this paper explores the potential causality between trade, development and pollution in order to show evidence for, or against, the theory that economic growth and increased trade can lead to improved environmental quality. This hypothesized relationship is called the Environmental Kuznets Curve. If this theory holds, where do countries with different trade levels lie on the curve? In the second part of the paper I examine the unique relationship between different pollutants and international trade, given a country's certain level of income, to isolate the channels that impact environmental quality measures in a country. These channels include, but may not be limited to, domestic policy decisions and industry specialization. The reader will receive a description of which trade regime characteristics are positively, or negatively, affecting environmental quality as well as a comprehensive explanation of why the effects may differ.

To Be Young, Gifted and BLACK

Amanda Eke
Sponsor: Elizabeth Constable, Ph.D.
Gender, Sexuality, and Women's Studies

For decades, black female musicians have contributed to the essential fold of artistry within the United States. Yet, their role as artists has invariably been complicated, if not intrinsically marred, by pressures to become figureheads of socio-political movements. As a result, their public statements have become topics of dialogue and debate for the greater world stage. My research asks whether black female artists can be artists without having to carry the burden of speaking for a whole segment of a population? In both past generations and contemporary times, black female musicians have sought to portray a more multi-faceted and multi-dimensional version of artistry within their music. My presentation investigates this history through song production, lyrical production, music videos, as well as gender roles played by black female musicians, such as Rihanna and Nina Simone. I compare this paradigm to emerging artistic paradigms such as the care-free black girl, that actively depart from taking up a political role in music. Ultimately this project seeks to use these layers to identify the complex mural of black artistry that exists.

Sod2 Expression in Aging Mouse Eyes

Garrett W. Elliott
Sponsor: Zeljka Smit-McBride, Ph.D.
Ophthalmology & Vision Science
School of Medicine

The purpose of the project is to investigate age-related changes of gene expression of manganese superoxide dismutase (Sod2) in young and old mouse ocular tissue. The protein product of the Sod2 gene is an enzyme that regulates amounts of damaging superoxides in cells. Age-related macular degeneration (AMD) is a leading cause of blindness worldwide for people over the age of 50. The main hypothesis is that ocular tissues from patients with AMD have high levels of tissue damage as a result of chronic exposure to such compounds in the eye. Our hypothesis is that this might be partially due to changes in expression of Sod2. We had two groups of mice, young (2 months old) and old (18 months old). Samples of each mouse's retinas and retinal pigment epitheliums (RPE) were collected. Then total RNA was isolated from each sample and checked for quality and concentrations. Quantitative polymerase chain reactions (qPCR) are now being done to detect levels of Sod2 expression. Our preliminary data suggests there is increased expression with aging in the RPE. Through defining this relationship, we aim to further advance current knowledge for AMD.

A Rodent Model to Assess the Effects of Sports-Related Concussion on Cognition Between Different Stages of Adolescence

Lauren Ekman
Sponsor: Gene Gurkoff, Ph.D.
Neurological Surgery
School of Medicine

In the United States, 1.7 million people experience a traumatic brain injury (TBI) annually. Many of these injuries occur in adolescents and are often associated with sports-related concussions. Increasing evidence indicates that even mild concussive TBI can lead to cognitive deficits. Previously we demonstrated that using an electrically driven piston to impact a metal disk helmet glued to the skull midline between lambda and bregma caused cognitive deficits in the absence of cell death in an early adolescent rat. Currently we are modifying the injury paradigms to determine whether we can create a similar injury in a late adolescent rat. To assess cognitive status, we test animals on post-injury days 4-10 on the Morris water maze, a spatial navigation task. The goal of this project is to develop a sports-related concussion model that can be used across adolescence in a rat. We then plan to use this model to provide insight on possible age-related differences in cognitive outcome following a sports-related TBI, as well as to assess treatment strategies.

A Pupillometric Perspective on the Attentional Prioritization of Emotional and Task-Relevant Distraction

Matthew V. Elliott
Sponsor: Steven J. Luck, Ph.D.
Psychology

For more than fifty years, pupillary response has been used to provide a continuous, physiological measurement of cognition. Increased pupil size, or dilation, is a reliable indicator of the allocation of attention, and is easily measured using an infrared eye- tracking camera. One axiom in pupillometry is that viewing an emotional stimulus leads to a substantial response. Our first experiment compares the pupil response elicited by emotional distractors with that elicited by distractors that are semantically related to a prescribed target category. We expect to find a significant pupillary response for both distractor types, with emotional images evoking a greater physiological reaction. Our second experiment investigates how manipulating the specificity of the prescribed target affects the pupillary response to both emotional and semantically-related distractors. We hypothesize that greater target specificity will cause larger responses to the emotional distractors, but smaller responses to semantically-related distractors. The results of our study will give direct, physiological insight into how the processing of different environmental stimuli varies depending on emotional content, task relevance, and task-specificity.

Identification and Characterization of the Nuclear Localization Signal of MXD3 in Human Glioblastoma Cells

Sam Elmojahid
Sponsor: Elva Diaz, Ph.D.
Pharmacology
School of Medicine

Glioblastoma multiforme is the most common and aggressive adult brain tumor that arises from glial cells (Bleeker et. al. 2012). MXD3 is a basic-helix-loop-helix-leucine-zipper transcription factor involved in cellular proliferation and is upregulated in glioblastoma (Barisone et. al., 2012, Barisone et. al., 2008). Nuclear localization signals (NLS) are responsible for the transport of proteins that contain them into the nucleus. The NLS for MXD3 has been predicted using an NLS prediction program for importin α-dependent nuclear localization signals, but not yet confirmed via structure-function studies. In order to gain a better understanding of MXD3, we conducted structure-function studies in which deletions and replacements were made in the putative NLS. These NLS mutants will be compared to wild-type MXD3 in immunocytochemistry experiments to determine if the putative NLS site is required for MXD3 nuclear localization. In addition, MXD3 mutants with altered subcellular localizations will be used in functional studies in glioblastoma cells to test the possibility of non-canonical functions of MXD3. These studies will help us gain a better understanding of MXD3 and how it functions in human glioblastoma cells.

Functional Analysis of Downy Mildew Effector Proteins Using Agrobacterium-Mediated Transient Protein Expression in Plants

Jesse J. Erandio
Sponsor: Richard W. Michelmore, Ph.D.
Plant Sciences

Downy mildews are oomycetes that cause diseases on many economically important plants worldwide. The Michelmore lab has sequenced the genomes of *Bremia lactucae* (lettuce downy mildew) and *Peronospora tabacina* (tobacco downy mildew) as well as several other related species and genes encoding potential pathogenicity related effectors have been predicted bioinformatically. For my project I have used molecular cloning to isolate and test some of the candidate genes of *B. lactucae* and *P. tabacina* in plants. Polymerase chain reaction (PCR) and Gateway cloning were used to amplify and transfer candidate effector genes into vectors for protein expression in plants. Effector activity was tested by using Agrobacterium-mediated transient expression in both lettuce (non-host) and tobacco (host) plants. Candidate genes that suppresses the plant immune system, or are recognized by host resistance genes, are considered to be effectors. In addition to understanding the molecular basis for pathogen infection, targeting and identifying the genes responsible for the expression of effectors will aid in the development of new disease resistant varieties. These genetic tools can be incorporated into other agricultural crops and restore economic damages that are caused by plant pathogens.

Individual Metabolism and Physiology Signature Study: High Fat/Sugar Meal Challenge Induces Effects in Heart Rate Variability

Elsa M. Esparza
Sponsor: Kevin D. Laugero, Ph.D.
Nutrition

Cardiovascular disease (CVD) is the leading cause of death worldwide. Understanding the risk factors for CVD may yield important insights into the prevention of this health concern. Autonomic imbalance, characterized by an overactive sympathetic system and underactive parasympathetic system is associated with various diseases. Heart rate variability (HRV) and respiratory sinus arrhythmia (RSA) may be used to assess these imbalances. As part of our study, we measured an individual's ability to handle a nutrient load and assessed how that affected the autonomic nervous system. Using noninvasive measures through the electrocardiogram, we measured HRV and RSA. Currently in the beginning stages of a four-year intervention, a limited number of subjects' RSA levels were analyzed before and after a High Fat Meal Challenge. We found an increase in RSA following the meal with a tendency toward statistical significance. The study is going in the direction we expect, as our preliminary results are consistent with basic physiological and evolutionary principles. Future research will attest to whether there exist different groups of responders and how that links to the individual characteristics of each subject. These results are not seen looking at heart rate alone, making HRV a promising marker of impending disease risk.

A Literary Response to Inequality

Neusha Etemad
Sponsor: Evan Watkins, Ph.D.
English

Family structures serve a means of explaining the unequal status of the black community in America. In his study, "The Negro Family: The Case for National Action (1965)," Daniel Patrick Moynihan offers a white, conservative perspective, implying that the black community is unadvanced because of its deviant familial structures. James Baldwin responds to Moynihan in *Little Man, Little Man* (1976) with characters that defy normative familial discourses. Baldwin's strategy is using literature as a means of embedding certain questions, including whether or not the matriarchal structure of black families is problematic. Baldwin's literary response suggests that Moynihan is one-sided in his perspective on the black community because his argument relies on gender stereotypes. In *Giovanni's Room* (1965), Baldwin responds to Moynihan by addressing the concept of queerness in black and white social groups and the resulting production of non-normative families. By contrasting these two perspectives, I will argue that Baldwin's view is a more contemporary and advanced one—he dispels gender stereotypes through his non-normative representations of gender, sexuality, and family. By doing so, Baldwin illuminates the idea that blackness is defined through the larger, white culture, offering us a unique perspective on racial inequality.

Reconstructing Ancient Dietary and Mobility Patterns Using Stable Carbon and Nitrogen Isotopes in Dentinal Collagen

Angela M. Evoy
Sponsor: Jelmer W. Eerkens, Ph.D.
Anthropology

Stable isotope analysis was used to reconstruct intra-individual dietary variation in a 3000-year-old Early Period archaeological site in California's San Joaquin Delta, along Bear Creek in the modern city of Stockton. This study uses 13C/12C and 15N/14N values in dentinal collagen from serial sections extracted from permanent third molars (wisdom teeth) to reconstruct dietary life histories of six individuals. Third molars typically form between age 10 and 22, and because "you are what you eat", stable isotope analyses of growth layers within these teeth inform on dietary patterns during this window of life. Carbon isotopes provide information on the consumption of terrestrial vs. brackish and marine foods, while nitrogen isotopes inform on the general trophic level of dietary protein. In particular, the study aims to evaluate whether males and females consumed the same types of foods during their teenage years, and/or may have made short-term or long-term migrations to different regions in Central California, perhaps as part of post-marital residence shifts.

Identifying the Extracellular Binding Partners of N-Cadherin and Its Implications for Cancer Cell Migration

Makena L. Ewald
Sponsor: Soichiro Yamada, Ph.D.
Biomedical Engineering

Many epithelial derived cancer cells upregulate N-cadherin. N-cadherin is a cell adhesion protein that interacts with neighboring cadherins at the extracellular domain and catenins at the intracellular domain. By interacting with catenins, N-cadherin regulates the actin filament network and promotes collective cell migration. While the intracellular protein interaction of Ncadherin is well studied, little is known about the function of N-cadherin's extracellular domain besides N-cadherin's adhesive role. We demonstrated that N-cadherin exerts traction forces without the cytoplasmic domain. This is surprising because the cytoplasmic domain is thought to be necessary for force generation. We hypothesize that the N-cadherin actin linkage is mediated by the extracellular binding partners of N-cadherin. By comparing deletion mutants of Ncadherin containing either the intracellular or extracellular domain to the full length N-cadherin, we will purify and identify binding partners of the extracellular domain of N-cadherin. We will test the functions of the extracellular binding partners of N-cadherin to reveal their potential roles in cancer cell migration and force generation.

The Anarchic Semantics of Richard Mutt

Danielle Fabian Bronson
Sponsor: James Housefield, Ph.D.
Design

Marcel Duchamp is arguably one of the most polarizing and influential artists of the 20th century. His readymades were an exercise in artistic choice that presented mass-produced objects as art, a gesture that differed sharply from the traditional notion of the artist as a maker of hand-made goods. This paper centers upon Marcel Duchamp's readymade 'Fountain', a urinal that he submitted under the pseudonym "Richard Mutt" to an art exhibition in 1917. This paper analyzes the semiotic discrepancy in meaning between Duchamp's signature on 'Fountain' and its status as a pseudonym by using the theories of the radical individualist anarchist Max Stirner. Art historians commonly argue that the readymade's status as a consumer good functions as a method of critique of the aesthetic institution; such arguments tend to emphasize the logical discrepancy between the 'readymade' object's aesthetic and utilitarian functions. I argue that the semantic displacement of signifier versus signified within Duchamp's anagrammatic pseudonym reinforces the theory of the readymade's logical displacement between art and utilitarian object. This paper argues that this discrepancy in meaning is a linguistic gesture of anarchy that assaulted the status and identity of the artist, the arts institution, and the system of language.

In Response to California's AB 1826: How the Redirection of Food Waste From California's Landfills Will Alter Greenhouse Gas Emissions From Compost

Kenna R. Fallan
Sponsor: William Horwath, Ph.D.
Land, Air & Water Resources

In 2014, California Governor Jerry Brown approved Assembly Bill 1826, mandating that as of April 1, 2016, any business that creates over eight cubic yards of organic waste per week must arrange for recycling or diversion of those materials from the landfill. As a result, communities on a local, regional, and statewide level will need to reassess their management strategies for organic waste, where ultimately the volume and ratios of material is likely to be diverted to compost facilities. In order to determine the environmental consequences of this change in waste management, we are comparing greenhouse gas emissions, among other chemical and biological properties and processes, of two compost windrows systems, each consisting of a different green waste to food waste ratios. Thus far, we are four weeks into our eleven-week data collection period. Although differences in the two compost systems are clear, we will continue observation to reach definitive conclusions. Ultimately, the results of this experiment will support California in making the most ecologically responsible decisions in its shift of organic waste management.

The Transmission of Bifidobacteria via the Built Environment: Infants and Mothers as Sources

Alexis Faria
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Bifidobacteria inhabit the infant gastrointestinal tract and have been linked to increased resistance to pathogens. It is unknown how infants acquire bifidobacteria, though it has been hypothesized that this bacteria is passed from mother to child or between infants, possibly via the surrounding human-built environment. This study investigates potential built environment-mediated transmission of bifidobacteria to infants. To determine if bifidobacteria were present in locations frequented by infants and mothers, swab samples were collected from surfaces with which they come into contact, including surfaces in lactation rooms (where only mothers are present), baby-changing tables (with which both mothers and babies interact), and daycare centers (where children mutually interact). Dual swabs were collected at each sampling location: one for plating onto selective media and the other for DNA sequencing analysis of the microbiota. Isolates were obtained from the plates and identified using Matrix-assisted Laser Desorption Ionization (MALDI) Biotyper and bifidobacteria-specific Terminal Restriction Fragment Length Polymorphism (Bif-TRFLP). Preliminary results confirm that bifidobacteria are found in areas frequented by breast-feeding mothers, suggesting that mothers are potential bifidobacterial vectors. Future experiments will investigate whether bifidobacteria may be transmitted between infants and how the microbiota of these surfaces differs between sites, environmental conditions, and over time.

Deconstructing the Malala Paradigm: An Anti-Imperial Insight Into the Circulation of the Nobel Prize Winner's Narrative

Azka Fayyaz
Sponsor: Omnia El Shakry, Ph.D.
History

After being shot by the Tehrik-i-Taliban Pakistan (TTP) on October 9, 2012, Malala Yousafzai quickly emerged as a leading figure in the global campaign for women's education. In mainstream discourse, Yousufzai represents a beacon of 'progressive' and liberal values. I place this pattern of representation within a broader historico-political context, and argue that it remains within the logic of an ongoing imperialist war, in which feminist discourse continues to serve as a basis for military operations—including drone strikes in Northwest Pakistan. Although as an individual Malala has publicly critiqued these drone strikes, the *figure* of Malala continues to function as an ideological means of sustaining colonial relations both in Pakistan and the broader Muslim world. Moreover, her story upholds Orientalist assumptions, within which educated (Westernized) women are autonomous and strong, while women in the East who assume 'traditional' roles in the home are docile, submissive, and needing (military) liberation from Western forces. By analyzing interviews and speeches featuring Malala, documents on the universal rights of individuals, and anthropological literature I argue that in the Malala narrative, the 'right to education' exists in an ahistorical vacuum, while the 'right to read' supersedes any 'right' to national self-determination.

Identifying the *Meloidogyne hapla* Locus Mediating Virulence on the *Phaseolus vulgaris* Cultivar NemaSnap

Farhad K. Fazel
Sponsor: Valerie M. Williamson, Ph.D.
Entomology & Nematology

Meloidogyne hapla, commonly known as the root-knot nematode, is an agricultural pathogen that reproduces in various plant-hosts, including beans. They are responsible for a substantial decrease in crop yield and quality, throughout the world. Previous studies of similar pathogen-host relationships have suggested a gene-for-gene relationship between *M. hapla* strains and beans. Therefore, my lab is investigating the *M. hapla* locus mediating virulence on the *Phaseolus vulgaris* cultivar NemaSnap. Experiments are being carried out to compare the reproduction of the *M. hapla* strains LM and VW9, on the bean cultivars NemaSnap and Blue Lake. NemaSnap is resistant to VW9 and susceptible to Blue Lake, while LM is virulent on both bean cultivars. Two types of reproduction assays were used to examine the numbers and stages of development of both nematode strains on beans. In the greenhouse, both bean cultivars were inoculated with 2nd stage juveniles (J2) of LM and VW9, two weeks after germination. Seven weeks after inoculation, the nematode cultures were stained to record the number of egg masses. Similarly, in the laboratory, bean roots were inoculated with J2 of LM and VW9, and the nematode phenotypes were examined at various time points, during the first week after infection.

A Geochemical Exploration of the Lake City Mud Volcano Eruption of 1951

Colin M. Ferguson
Sponsor: Robert A. Zierenberg, Ph.D.
Earth & Planetary Sciences

Lake City Hot Springs (LCHS) is an active geothermal area in Surprise Valley, NE California. In 1951, locals reported explosive activity from LCHS, venting steam with enough force to eject mud at least two miles to the south. The goal of my work is to establish the temperature regime of the springs, the water source, and the nature of what caused this eruption. I have collected mineral samples of brecciated calcites from the site for mineralogic and geochemicial analysis. Petrography of thin sections made from these samples shows evidence for multiple generations of calcites formed at variable elevated temperatures around boiling. Thick sections yielded high quality fluid-vapor inclusions from primary and secondary fluids. Analysis by in-situ freezing and vaporization of these inclusions yielded only slightly elevated pressures, and temperatures consistent with observed petrography, near 95°C. The formation of a cap of calcites in the sediments at shallow depth allowed for steam pressure to build below that cap until it reached a pressure that could no longer be contained. Formation of the calcite cap is the result of the lowering of the water table due to consecutive drought years and the pumping of ground water for agriculture.

Fourier Transform Infrared Spectroscopy and Implications for Measuring Organic Carbon in the Atmosphere

Katayun Fethat
Sponsor: Ann Dillner, Ph.D.
Land, Air & Water Resources

Each day, thousands of people are enjoying the beautiful natural scenery provided by National Parks and Wilderness Areas across the United States. Unfortunately, increasing levels of haze and particulate matter (PM) pollution tarnishes the visibility of these stunning views. Through the monitoring of organic carbon (OC) and other pollutants in the atmosphere, the Interagency Monitoring of Protected Visual Environments (IMPROVE) program establishes the current visibility conditions and tracks visual impairment at all National Parks and Wilderness. The current method of measuring OC in IMPROVE is by a thermal methodcalled thermal–optical reflectance (TOR), an expensive and slow method. The IMPROVE program at UC Davis aims to use Fourier transform infrared (FT-IR) spectroscopy to non-destructively gather absorbance spectra from atmospheric PM collected on polytetrafluoroethylene (PTFE or Teflon) filters to measure OC. As outlined by prior work (Dillner and Takahama, 2015), FT-IR technology is rapid and inexpensive when compared to TOR. This research will allow for non-destructive, less expensive identification of visibility impairments across monitored sites, and determination of possible causes for such impairments.

Graphic Memoir and Embodiment: An Exploration of Gender, Sexuality, and Feminism Through the Medium of Graphic Novels

Caitlin Flaws
Sponsor: Elizabeth Constable, Ph.D.
Gender, Sexuality, and Women's Studies

Within Alison Bechdel's Fun Home, there are multifaceted potentials when a woman depicts her own life through the medium of comics. These complexities are manifested in the author's artwork, rendering of real life artifacts, how the author draws their own self and other family members, and many other objects that shape and complicate autobiographical graphic novels authored by women. Fun Home's brutal honesty about sexuality and gender expression led me to examine and analyze more graphic novels like Bechdel's, in which adolescent social identities and gender are presented through this focus on embodiment. The Voyeurs by Gabrielle Bell and Tomboy by Liz Prince also highlight the topic of embodiment alongside sexuality and gender. Are You My Mother?, a sequel to Fun Home, complements this discussion of embodiment by offering a larger outlook on adolescent environment. These graphic memoirs explore the author's struggle with embodiment of their emerging sexuality, gender, and the formation of their own feminist values and principles.

Analysis of Antarctic Microbial Mats Through 3D Modeling

Alicia Figueroa
Sponsor: Dawn Sumner, Ph.D.
Earth & Planetary Sciences

The McMurdo Dry Valleys, Antarctica, is viewed as one of the most extreme deserts on the planet. Lake Joyce is a perennially ice-covered lake in the dry valleys and despite the harsh climatic conditions, diverse microbial mats are able to exist. Microbial mats are multilayered microbial communities that produce a "mat-like" structure. Microbial mats develop over time due to many factors, such as microbial growth and activity, sedimentation, etc. The heights of the microbial mats in Lake Joyce vary throughout the lake. Focusing on microbial mats closer and further from the delta of Lake Joyce may give us insight on other factors that affect their growth over time. There is currently no defined quantitative description of microbial mats. In this study, various software programs and the UC Davis KeckCAVES were used to measure and analyze our data by reconstructing photographs of the microbial mats into 3D reconstructions. We focused on microbial growth from different distances from the delta of Lake Joyce. The results showed that microbial mat growth is vibrant further away from the delta and scarce closer to the delta. We have concluded that we need to consider the location as a factor in microbial growth.

Characterization of Lrig1 Knockdown in ErbB2 Overexpressing Mouse Mammary Tumor Cells

Michael A. Flores
Sponsor: Colleen Sweeney, Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

The human epidermal growth factor receptor 2 (ErbB2), a member of the receptor tyrosine kinase (RTK) family, plays an important role in the development and progression of 20-30% of breast cancers and its expression serves as a clinically useful prognostic marker. Leucine rich repeats and immunoglobulin-like domains 1 (Lrig1) is a negative regulator of RTKs. The mouse mammary tumor virus (MMTV)-ErbB2 strain of transgenic mice express a constitutively active, mutant form of ErbB2 that induces mammary hyperplasia and tumorigenesis. It serves as a functional *in vivo* model for human ErbB2-positive breast carcinomas. Surprisingly, Lrig1 ablation in this engineered mouse model has not led to spontaneous tumor formation in the mammary gland, requiring further elucidation of Lrig1's function in mammary epithelium. I hypothesize that Lrig1 is required for the survival and/or expansion of ErbB2 overexpressing mouse mammary cells. I have conducted *in vitro* studies by knocking down Lrig1 expression in ErbB2 overexpressing mouse cell lines to elucidate the role of Lrig1 in ErbB2 regulation of mouse mammary epithelium. These cells were studied in assays which measure cell proliferation, migration, and sphere formation of which indicate Lrig1's necessity as a negative regulator of RTKs.

Dynamics of Signal Transduction During Plant Defense Pathway

Rosalva Flores
Sponsor: Savithramma Dinesh-Kumar, Ph.D.
Plant Biology

Plants have evolved various sophisticated defense mechanisms to defend themselves against invading pathogens. Plants detect conserved molecular clues associated with pathogens also called pathogen associated molecular patterns (PAMP's) to initiate a defense response known as PAMP triggered immunity (PTI). One of the most well studied PTI pathway's begins with the binding of bacterial flagellin to the extracellular leucine-rich repeat (LRR) domain of FLS2: In the absence of flagellin; an intracellular receptor like kinase called BIK1 is consecutively associated with intracellular kinase domain of FLS2. Upon flagellin binding; FLS2 rapidly phosphorylates BIK1 which leads to BIK1's dissociation from FLS2. Using biochemical approaches I will investigate the timescale of BIK1 dissociation from FLS2 upon flagellin binding. Once I have established this experimental set up with wild type plants, I will use mutant BIK1 plants generated by our lab, where key phosphorylation sites of BIK1 are mutated. Using the same approach mention above, I will test if any of these mutations has an effect on the dissociation of BIK1 from FLS2.

Orange and Red Beet Juice Quality and Nutritional Content After Thermal and High Pressure Processing

Clair G. Floyd
Sponsor: Gail Bornhorst, Ph.D.
Biological & Agricultural Engineering

The objective of this study was to determine the influence of thermal and high pressure pasteurization on juice quality and nutritional content. Orange, red beet, and orange-red beet juice were made from concentrate to 12°Brix. Juices were processed by heating to 90.6°C for one minute or four minutes of high pressure treatment at 600 MPa. Raw (un-pasteurized juice) was used as a control. Titratable acidity, Color (L*a*b*), total polyphenol content via the Folin-Ciocalteu method, and ascorbic acid concentration via titration with 2,6-Dichloroindophenol sodium were measured. The change in color space (ΔE) from un-pasteurized juice was greater for high pressure processed juice compared to thermally processed juice (2.97 vs. 1.51 for orange juice). Total polyphenol content increased for all thermally processed juices, with 15%, 19%, and 10% increase from unprocessed orange, beet, and orange beet juice, respectively. However, high pressure processed orange and orange-red beet juice total polyphenol content decreased after processing (7-30% decrease). Ascorbic acid concentration in orange juice increased more from raw after thermal processing (25% increase) compared to high pressure processing (4.5% increase). Future studies on the impact of processing on the bioaccessibility of these nutrients will be important to help juice manufacturers produce healthier options for consumers.

Effect of Estrogen, Progesterone, and Prolactin on Mammary Epithelial Cell Growth in Ovariectomized Pigs

Meghan Foote
Sponsor: Russell Hovey, Ph.D.
Animal Science

Development of the mammary gland (MG) is regulated by hormones including estrogen (E), progesterone (P), and prolactin (PRL). Dogma suggests that E and P act on epithelial cells possessing estrogen and progesterone receptors (ER, PR respectively), which stimulate neighboring cells to undergo mitosis, while not dividing themselves. The MGs of pigs are similar to human breasts and are valuable models for researching hormonal regulation. In a previous study, 32 nulliparous female pigs were ovariectomized and given 2-bromo-ergocryptine to block prolactin secretion before receiving different combinations of E, P, and/or PRL for 5 days to stimulate mammary growth. Proliferating cells were labeled with BrDU, injected 24 hours prior to euthanasia. Treatment with a combination of E, P, and PRL led to maximal epithelial cell division, but decreased incidence of ER and PR. Fluorescent immunohistochemistry for ER, PR, and BrDU was performed, allowing for the co-localization of cells that are steroid receptor positive and mitotic. We hypothesize that cells expressing both these characteristics will be more abundant in pigs treated with all three hormones. Understanding regulation in these cells will lead to a greater understanding of how mammary epithelial cells communicate with each other in normal development and breast cancer.

Effects of Early Visual Deprivation on Gene Expression Patterns in Developing Neocortex

Kaitlyn M. Foreman
Sponsor: Danielle Stolzenberg, Ph.D.
Psychology

Experience driven inputs are critical contributors to the development of sensory systems. For example, the plastic responses of the neocortex during the early life period allow for significant organization of the visual system in response to visual inputs. In the absence of visual input, this plasticity allows for an adaptive reorganization of visual cortex. Here we use a marsupial model organism, monodelphis domestica, in which sensory inputs can be manipulated ex-utero at an age that is equivalent to embryonic development in rodents in order to examine how the visual cortex develops in the very early absence of visual input. Specifically, we will examine how early visual deprivation, prior to the organization of visual cortex, alters the expression of key genes involved in axonal guidance, cortical arealization, and cortical connectivity. An understanding of the molecular mechanisms underlying how the cortex is reorganized in the absence of early visual inputs will contribute to our understanding of human blindness and may impact therapeutic interventions.

Effects of Sugared Beverages on Stress and Anxiety Disorders: Implications to Health

Natasha Fowler
Sponsor: Kevin D. Laugero, Ph.D.
Nutrition

Chronic stress is a growing health problem that affects the way the brain and autonomic nervous system (ANS) respond to stress, and increases the risk of contracting chronic diseases (i.e. obesity, depression). Although current pharmaceutical approaches for treating stress-related diseases target these stress response systems, there remains a need for more specific and effective treatment/prevention methods. One potential approach is through nutritional interventions. However, scientific evidence for the effects of various nutrients on stress system function and stress-related diseases is lacking. This study tests the potential for high-sugar beverages to mitigate the stress response, and in turn, improve stress resilience and reduce disease risk. This study has a cross over design consisting of three tasks: drink, anger, stress task. Skin conductance and heart rate variability (HRV) were examined throughout each task to measure theses changes. Mood surveys were also administered after each task. Additionally, participants recorded 24 hours of HRV data prior to the study for comparison against the experimental measurements. Ultimately, this work will help to establish an experimental model for testing the roles of key homeostatic systems in nutritional responsiveness and how variable responsiveness of these systems influences the effects of nutrition on mental and metabolic health.

Neither This nor That: French Women in Liberation and Postwar France

Lara M. France
Sponsor: Susan G. Miller, Ph.D.
History

From 1943 until 1947 nearly 20,000 French women, accused of collaboration with the retreating German forces, were publicly punished and humiliated in a series of extrajudicial, ritualized attacks which included: head shaving, marking of the body with ink and mercurochrome, and public nakedness which was often the focus of lurid and widely publicized photographs. These are the *femmes tondues*, forgotten completely, or until recently, remembered only as sexual collaborators. New scholarship, of which this research will be a part, has begun to challenge traditional binary narratives of collaboration and resistance; guilt and innocence; and voyeurism and neglect that has influenced the portrayals of postwar French women. I will seek to synthesize considerations of sexuality, class, and race into the account of these women while addressing the problematic way that their memory has been preserved. Through my research I hope to build on the works of Robert Paxton, Henry Rousso, Fabrice Virgili, Hanna Diamond, Alain Brossat and Miranda Pollard. I will do so by consulting contemporary testimony, memoirs, photographs and films, and recorded interviews, recently released, with women who survived the purge.

Analyzing the Predictors of Substance Abuse Among Incarcerated and Non-Incarcerated Youth

Konrad L. Franco
Sponsor: Ryken Grattet, Ph.D.
Sociology

The mounting long-term fiscal and societal costs of adolescent substance abuse has focused the attention of policy makers. Unfortunately, effective policy recommendations suffer from an incomplete grasp of the underlying predictive precursors that explicitly select for substance abuse. Earlier investigators concentrated on identifying predictors of substance abuse in average school children, thereby excluding a vitally important youth cohort, namely, incarcerated youth. This present study aims to interrogate the utility of General Strain Theory in predicting adolescent substance abuse for the distinctly different incarcerated youth. The Minnesota Student Survey of 2010 is a unique dataset compiled by the *Minnesota Student Survey Interagency Team* and administered to students ages eleven to eighteen across Minnesota's Public schools, Alternative Learning Centers (ALC), and Juvenile Correctional Facilities (JCF). Although exposure to negative life events and negative adult relationships were found to be strong predictors of substance abuse alone for Public school and ALC students, exposure to similar strains were found to be relatively weak indicators of substance abuse in JCF adolescents. Moreover, this present study does provide some evidence that personal and social resources, such as self-control and parental support, help predict the response of all adolescents to strain.

Effects of Human Lysozyme Transgenic Goat Milk on the Intestinal Microbiota of Pigs in a Dextran Sodium Sulfate-Induced Colitis Model

Kathleen L. Furtado
Sponsor: Elizabeth A. Maga, Ph.D.
Animal Science

Inflammatory Bowel Disease (IBD) encompasses multiple debilitating conditions that affect the lives of over one million Americans. IBD may be caused by several potential factors, including interactions between an individual's genome, immune system, and microbiota. Lysozyme, an antimicrobial enzyme naturally produced in human breast milk, is a key protective agent for infants, promoting a healthy balance of gut microbiota. Human lysozyme (hLZ) goat milk, derived from goats genetically engineered to express the gene for human lysozyme in their mammary gland, has been shown in past experiments to prevent and alleviate diarrhea. In a pilot study, Dextran Sodium Sulfate (DSS) produced an effective model of IBD in the pig, affecting microbial composition to reflect many specific microbes found in human IBD patients. In this study, pigs with DSS-induced colitis were treated with hLZ milk, goat milk, or no milk. Effects on microbial populations were investigated with next generation sequencing to identify bacterial taxa in stool and intestinal contents. Current results reflect positive trends with lysozyme treatment, as healing microbiomes began to appear similar to healthy controls. Through this study we hope to find further health benefits from our application of livestock biotechnology, to aid those in this country and beyond.

Effect of Atmosphere on Solidification of Hafnia, Zirconia and Alumina Melts

Matthew Fyhrie
Sponsor: Alexandra Navrotsky, Ph.D.
Chemical Engineering & Materials Science

This project attempted to determine whether or not there was a difference in the cooling traces of HfO_2, ZrO_2, and Al_2O_3 melted in Ar and O_2. The effect of the atmosphere on melting and solidification temperatures of these compounds is not well understood, and this study aimed to elucidate it. The spheroids of studied oxides between 2-3 mm in diameter were levitated in Ar and O_2, and brought above melting temperature by a 400 Watt CO_2 laser. After turning off the laser cooling traces were measured with a single wavelength pyrometer (Chino, 900 nm) and a spectropyrometer (FAR, 500-1000 nm). Solidification temperatures and solid state phase transitions were derived from thermal arrest or inflections observed on cooling traces. Results indicate that atmosphere induced changes in crystallization temperatures for HfO_2 and ZrO_2 are less than 20°C. In case of Al_2O_3 melt substantial undercooling resulted in recalescence peaks on crystallization. The uncertainties of the employed method and possible mechanisms of atmosphere on melting and crystallization will be discussed.

Regulation of TORC2 and the Role of Complex Sphingolipids During Caloric Restriction Induced Autophagy in *S. cerevisiae*

Allison Gabbert
Sponsor: Ted Powers, Ph.D.
Molecular & Cellular Biology

When cells undergo environmental stresses, they induce a self-degrading process called autophagy, where unnecessary cellular components are digested and recycled to assist survival in stressful conditions. *S. cerevisiae*, or budding yeast, is an ideal model organism for autophagy research because its mechanisms involving autophagy are translatable to human cells. This is especially important because autophagy is involved in human health problems such as neurodegenerative diseases, cancer, and aging. *S. cerevisiae* have two complexes, Target of Rapamycin Complex 1(TORC1) and Target of Rapamycin Complex 2(TORC2) that regulate autophagy depending on the stress experienced. Since TORC1 has been heavily researched and much less is known about TORC2, our research has focused on determining which stresses work through TORC2 and what components are involved in the response pathways. Caloric restriction (CR), or low glucose levels, has been shown to induce autophagy through TORC2, and many constituents make up the chain of events leading to autophagy, such as sphingolipids. We have been researching the components involved in the TORC2 pathway in autophagy, especially looking at caloric restriction and the role of sphingolipids.

Circadian Regulation of Floret Development in *Helianthus annus*

Marcus A. Gainer
Sponsor: Stacey L. Harmer, Ph.D.
Plant Biology

A circadian rhythm is an approximately 24-hour cyclical physiological process present in all higher eukaryotes which ensures that physiology is aligned with external environmental cues. In *Helianthus annuus* anthesis appears to display a diurnal rhythm where floret maturation is initiated every day at dawn. This project aims to determine if floret maturation is controlled by the circadian clock and how factors such as light and temperature affect this process. Sunflower heads were imaged under normal conditions (25°C and 16 hr light:8 hr dark days) to optimize anthesis under chamber conditions. Due to the size of full-grown sunflowers we optimized the protocol to analyze cut flowers, which maintained floret maturation timing. In cut or intact plants, the buds cracked open at 7am and the anther filaments reached full elongation at 9:30am. To assess the involvement of the circadian clock in sunflower anthesis the plants were also imaged under constant conditions. Temperature is closely linked to the clock and to assess the effect of temperature on the daily anthesis patterns, styles were collected at different temperatures during elongation and measured. These studies will further our understanding of the circadian clock and its influence on floret maturation in this iconic crop species.

Association Between Parental Nutrition and Exercise Habits and That of Their Mexican Heritage Children

Jose N. Galvez Hernandez
Sponsor: Banafsheh Sadeghi, M.D.,Ph.D.
Internal Medicine
School of Medicine

Obesity and overweight are health issues that have been increasing over the last decade as a global epidemic. Latino communities in California experience a disproportionate growth of obesity/overweight. It is not only affecting adults, but also the children. Through a United States Department of Agriculture (USDA) founded project, Niño Sanos, Familia Sana (Healthy Children, healthy Families), we have surveys and accelerometers to assess nutrition habits and physical activity of the youth in Golden plains & Firebaug- Las Deltas Unified school districts. Only surveys are available for the parents of the children. Data will be analyzed to examine any association between the parental nutritional and exercise habits, and their children's. Potential behavioral (nutritional and physical activity) risk factors of obesity and overweight will be identified. Any meaningful association can lead to research testing the effectiveness of a preventative intervention that targets the parents' habits in order to improve childhood obesity/overweight in Latino communities.

Mindset: What Is It Good For? A Lot!

Lydia M. Gandy
Sponsor: Julie B. Schweitzer, Ph.D.
Psychiatry & Behavioral Sciences
School of Medicine

Research has investigated the educational differences in typically performing students and students with learning disabilities (LD; Geary et al., 2007) but less has focused on what motivational factors underlie these differences. This study examines the relation between intrinsic motivation and grades with students who have a self-reported LD or attention-deficit hyperactivity disorder (ADHD). 470 participants (M = 23.71 years old, SD = 3.23 years old) completed an online survey. Individuals with a disability reported having higher intrinsic motivation (M = 4.11, SD = .62) than individuals without a disability (M = 3.80, SD = .73), and lower grades (M = 3.91, SD = 1.02) than individuals without a disability (M = 4.17, SD = .88). We examined how intrinsic motivation would interact with mindset, the belief that you can change your ability with effort. Mindset significantly moderated this mediation such that individuals with a fixed mindset earned lower grades regardless of intrinsic motivation, and individuals with lower intrinsic motivation were affected the most. These results start to disentangle the role of motivation and academic beliefs in achievement for individuals with ADHD and learning disabilities, and improve our understanding of how to help students with disabilities thrive in school.

Beyond Exploitation: Storytelling the Bracero Program

Carol E. Garcia
Sponsor: Marisol De la Cadena, Ph.D.
Anthropology

The Bracero Program, an agricultural migratory labor agreement between the United States and Mexico (1942-1964), constitutes the largest importation of foreign labor in U.S history that transformed Southwestern agriculture and set the foundation for the current migration from Mexico to the United States. Scholars refer to the program as a form of imported colonialism, question whether it improved the workers' (known as *braceros*) lives economically, and are often perplexed by the support that it receives from its alleged victims-the braceros themselves. In the paper, I present the stories of six of these men (gathered from personal interviews) to examine the bracero program from their *lived experiences*. I came to know my informants as gifted storytellers, in Walter Benjamin's sense of the term; neither journalistic nor historical 'information,' their narratives richly tell how their labor transformed the U.S agricultural landscape and they *experientially communicate* how agriculture, in turn, shaped their bodies and their lives. In my ethnography, I will argue that braceros' stories of work, sacrifice, success, exploitation, joy, and citizenship are the "stuff" that their lives were made of, which exceed large terms such as imported colonialism and the exploitative structure of the bracero program itself.

Child's Self-Report vs. Parent-Report of Negative Emotion in Mexican-Origin Families

Susana Garcia-Ruiz
Sponsor: Amanda E. Guyer, Ph.D.
Human Ecology

Anxiety and depression are prevalent disorders affecting Mexican-Origin youth in the United States (Glover, Pumariega, Golzer, Wise, & Rodriguez, 1999; Roberts & Sobhan, 1992). Previous studies on these disorders have found that parents' accurate awareness of their child's anxious and depressive symptoms confers benefits the adolescent is more likely to experience positive development. Research has also found that parents' perceptions of negative emotions are often accurate (Helsen, Volleburh, & Meuus, 1999). The present longitudinal study recruited Mexican-origin adolescents (N=76, M_{age}=19.2 years) and one of their parents. Participants completed the Short Mood and Feelings Questionnaire, a 13-item self-report questionnaire of depression and anxiety symptoms (Andrew et al., 1995). Parents completed the same measure to report on their adolescents. We predicted a positive correlation between adolescents' self-report and their parent's report. A positive correlation between parent and adolescent reports of the adolescent's negative emotions was found (r=.224, p=.052). Consistent with the literature, parent report of their adolescent's negative emotions positively relates to the adolescent's self-report, suggesting that parents accurately perceive their adolescent's negative emotions. This information is valuable for clinical treatment; parents may be accurate reporters of their child's emotional problems, and may be important targets for intervention.

Particle Tracking Method for Upscaling Reactive Transport in Porous Media

Titus Garrett
Sponsor: Timothy Ginn, Ph.D.
Civil & Environmental Engineering

Many chemical reactions in the environment depend on mixing between two solutions, where one displaces another. One example involves continuous injection of a solution into contaminated groundwater for remediation. To predict and control the impact of environmental pollution where mixing rates control reactions it is necessary to quantify the speed with which the governing reactions go to completion. The challenge in characterizing the rates is that the mixing occurs at small scales and is difficult to simulate deterministically. We outline a new approach that focuses on the mixing front at the interface between two solutions moving in a heterogeneous flow field. By simulating the transport of particles placed along the initial interface we can mathematically approximate the mixing front position and deformation at any given time. The interface segment between each pair of mathematical particles is called a lamellae that is a linearized piece of the interface. We develop lamellae-based averaging methods useful for determining the overall reaction rate even in highly complicated flow fields. The reaction extents are expressed given the geometry of a given lamellae, and this allows us to sum the reaction rate of all the lamellae in order to find the overall rate of reaction.

Cognitive Ability and Support Predict Depression and Enjoyment Two Years Later

Jessica N. Gee
Sponsor: Lisa S. Miller, Ph.D.
Human Ecology

The current study examined relations between cognitive functioning and receiving care on patients' emotions over time. Based on studies that highlight the importance of social support (e.g., Moren-Cross & Lin, 2006) and cognitive functioning on well-being, we predicted that individuals who received care would have greater well-being, and furthermore, that the relation would be moderated by the patient's cognitive ability (i.e., delayed recall). Participants were 1,938 patients (M_{age} = 69.16, SD_{age} = 10.76) from the Health and Retirement Study, which follows individuals as they enter into retirement. Measures of delayed recall, help from others, and emotional well-being were taken from participants at baseline and then again two years later. Results indicated that patients receiving care who had higher delayed recall also had lower levels of depression (β = -.17, $p < .05$) and higher levels of enjoyment (β = .16, $p < .05$) two years later, than patients with low delayed recall. However, patients receiving no care did not differ in depression or enjoyment despite recall ability. This has important implications for elder and health care because it demonstrates how caregiving (support) and cognitive ability of the patients influences individuals' emotional well-being.

Single-Molecule Resolution Footprinting of R-Loops in the Human Genome

Jenna M. Giafaglione
Sponsor: Frédéric L. Chédin, Ph.D.
Molecular & Cellular Biology

R-loops are a class of non-B DNA structures in mammalian genomes that form upon the annealing of an RNA molecule to one strand of the DNA duplex. The RNA:DNA hybrid displaces the second strand of the DNA duplex, thus creating a looped structure. Previous studies have shown that R-loops may be associated with genome instability, origins of replication, and transcription termination. The location of these R-loop structures can be mapped with single-molecule resolution using a non-denaturing bisulfite treatment, which has high sensitivity for single-stranded DNA. When subjected to a bisulfite treatment in a non-denaturing manner, cytosine bases on single-stranded DNA will undergo deamination to become uracil bases. Upon PCR followed by sequence analysis, R-loops appear as long stretches of C to T conversion at specific loci. This method has resulted in the identification of the longest known R-loop (up to 1.6 kb) as well as shown that R-loops are highly strand-specific and that a subset appear to initiate near exon/intron boundaries.

Histamine Enhances Excitability in Hippocampal Neural Networks of Hibernating and Winter-Acclimated Non-Hibernating Syrian Hamsters

Shadeh Ghaffari-Rafi
Sponsor: Barbara A. Horwitz, Ph.D.
Neurobiology, Physiology & Behavior

We previously showed that the neuromodulator histamine, acting on H2 receptors, increased excitability of CA1 pyramidal neurons of summer-acclimated Syrian hamsters (14:10 hr light:dark; 22 ± 2°C,), making them more responsive to low amplitude afferent signals from CA3 neurons. This increased excitability, coupled with the report that micro-infusion of histamine into hippocampi of hamsters in hibernation delayed arousal, suggests that in vivo, histamine enhances hippocampal CA1 neural suppression of the ascending arousal system. Because direct measurement of neuronal excitability in response to histamine applied to hippocampal slices from hibernating hamsters had not yet been evaluated, I tested the hypotheses that: (1) in such slices, histamine would enhance signaling over the CA3 to CA1 neural circuit at low excitation levels (comparable to what is likely present during hibernation) and low temperature (20°C); and (2) exposure of hamsters to "winter like" conditions (8:16 hr light:dark; 6 ± 1°C) that prepare them for hibernation is sufficient to induce this enhancement. Preliminary results indicate that at low excitation levels, histamine did in fact increase responsiveness of population spike amplitudes, a measure of neuronal activity, in slices from hamsters in hibernation and in those from hamsters acclimated to winter-like conditions, consistent with my hypotheses.

Catalan Modernisme and Nationalism

Jada Gilbert
Sponsor: Mark Kessler, M.A.
Design

This project explores direct ties between the nationalism of a large sector of the Catalan people and the Catalan Modernisme architecture of Antoni Gaudí and Lluís Doménech i Montaner. Montaner's Palau de la Música Catalana explores overt Catalan symbols in interior decoration and architecture. In comparison, Gaud"s Sagrada Familia reveals its relationship to Catalan nationalism through a deep connection to Catalan landscape, culture, and generational additions to the site. While working and exploring for six weeks in Barcelona, Spain, I documented my visits to Modernisme architectural sites through photographs, sketches and notes. I returned to Davis to further my research with a focus on published academic writings related to Catalonia. This project not only relates Catalan Modernisme architecture to Catalan nationalism, it realizes the modern political and social implications of a historic architectural movement. Through first hand experience and extensive research, I have found that the Palau de la Música Catalana and The Sagrada Familia stand, to this day, as beautiful and unique symbols Catalonian independence and nationalism.

Glutamate Scavenging Enzyme Reduces Behavioral Deficits After TBI in Rats

Christopher Gilliam
Sponsor: Bruce Lyeth, Ph.D.
Neurological Surgery
School of Medicine

A rapid and excessive glutamate release into the extracellular space following traumatic brain injury (TBI) has been implicated in neuronal excitotoxicity and poor cognitive outcome. The plasma resident enzyme, glutamate-oxaloacetate transaminase (sGOT), has been shown to be an effective treatment strategy in brain injury from stroke due to its blood glutamate lowering potential. The objective of this study was to examine rGOT and co-substrate oxaloacetate as a treatment modality in a lateral fluid percussion model of experimental TBI. 34 adult rats were randomly assigned to four groups: Sham, TBI+vehicle, TBI+rGOT (130µg/kg), and TBI+rGOT+Oxal (15mg/kg). Immediately post-TBI or sham surgery, treatments were administered via the lateral tail vein. Long-term cognitive functions and motor functions were assessed using the Morris water maze (MWM) and rotarod tests, respectively. Our results showed that rGOT+oxaloacetate treatment produced a trend in improving overall spatial learning and memory performance compared to the vehicle control. Furthermore, the rGOT alone or rGOT+oxaloacetate treatment groups showed improvement in overall sensorimotor function compared to the vehicle control. In summary, our results demonstrated that treatment using a novel therapeutic approach with a plasma resident enzyme, rGOT, can be effective in reducing cognitive-behavioral deficits after TBI.

RNF212 Is a Positive Regulator of Crossovers Observed During Meiosis

Christopher A. Glorioso
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Homologous recombination and crossover formation are highly regulated processes involved in gamete development. Defects in these processes can lead to various problems, including aneuploidy, miscarriage, and infertility. RNF212 is a dosage dependent protein that is essential for establishing crossover sites. RNF212's role as a key player in crossover formation is further strengthened by observed haploinsufficiency in heterozygous mice. To further explore the relationship between RNF212 and crossover formation, we generated bacterial artificial chromosome transgenic (BAC-Tg) mice containing the mouse RNF212 gene under native promoter. We bred multiple mouse lines expressing different levels of the RNF212 protein, and used q-PCR to confirm the number of RNF212 gene copies in each line. We then analyzed the relationship between RNF212 and crossover formation by quantifying MLH1 foci (spermatocyte spreads) and chiasmata structures (metaphase spreads) as indicators of crossover formation from each line. Our RNF212-BAC-Tg mice revealed a significant increase in MLH1 foci compared to age-matched littermates. Interestingly, most of the extra crossovers in the Tg^{+ve} lines were associated with middle-sized chromosomes and occurred closer to the centromeres. However, interference levels between MLH1 foci did not differ significantly between the RNF212-BAC-Tg mice and wild type controls.

Computational Identification of Celiac-Toxic Peptides in Common Grains

Alexander Godbout
Sponsor: Ian Korf, Ph.D.
Molecular & Cellular Biology

Celiac disease affects one in every one hundred individuals in the United States. When an individual with celiac disease consumes gluten-derived peptides, an immunological response occurs in the gut that damages the small intestines. Currently, it is known that non-wheat peptides, similar to those found in gluten, are also celiac-toxic. This study identified additional celiac-toxic peptides in soybean, castor bean, sorghum, barley, Asian wild rice, african rice, and Indian wild rice. A query of gene ontology terms were optimized by a genetic algorithm to selectively retrieve edible portions of proteomes. This query was then used to retrieve edible proteins from the protein database UniProt. Ultimately, the peptides of these proteins were analyzed with sequence comparison algorithms, which identified candidates for celiac-toxicity. As expected, wheat contains the most peptide candidates for celiac-toxicity. Celiac-toxic peptide candidates were also found in almost all the other organisms examined. These findings may inform the design of in vivo studies to further evaluate dietary choices for individuals with celiac disease.

Predictive Toxicology: Evaluation of High Throughput Screening Data for Thyroid Hormone Receptor Activity

Jennifer Gold
Sponsor: J. David Furlow, Ph.D.
Neurobiology, Physiology & Behavior

Thyroid hormone (TH) is a facilitator of several physiological functions including growth, nervous system development, and metabolism. Therefore, endocrine disruption by chemicals affecting TH signaling could have detrimental effects in both developing children and adults. In collaboration with the Environmental Protection Agency, our stable reporter cell line for TH action was tested against approximately 9,000 chemicals in high throughput screening assays. When I analyzed the data, I discovered that Bisphenol A and Anthraquinone derivatives acted as antagonists of TH action. Surprisingly, many chemotherapeutic agents did so as well. Organotins and a series of retinoids, chemicals known to interact with the TH receptor (TR) partner RXR, acted as mixed agonists/antagonists. On the agonist side, beyond the partial agonism shown by the RXR ligands, very few additional chemicals were active. Our hypothesis is that positive hits from the high throughput screening will be active in vivo during development. Therefore, we will validate a subset of highest concern using an amphibian metamorphosis assay, and gather exposure data to predict potential risk to human populations. In summary, high throughput screening indicates that alteration of RXR signaling can impact TH action, an unexpected and potentially new way of TH endocrine disruption.

Homerange Expansion and Extinction: A Primate's Ability to Expand Their Homerange as an Indicator for Extinction

Robyn N. Goldberg
Sponsor: Lynne A. Isbell, Ph.D.
Anthropology

Extinction is a pressing problem for many of the world's species, and primates are no exception. This project looks at 10 of the 25 most endangered primates based on the biennial listing of a consensus of the 25 primate species most endangered worldwide from 2012–2014. This project then analyzes the abilities of these primates to expand their homeranges in comparison to non-endangered primates. I expect to find a correlation between a species' ability to expand their homerange and their risk of extinction. In order to get a broad view of the topic, the species studied were from African, Asian, Madagascan, and Neotropical habitats. Information was gathered on each species using published scientific literature comprising of observations and data of the behavior and ranges of these species. The information collected will be compared and vetted against current accepted theories in primatology in order to determine and measure the effect to which a primate's ability to expand their homerange plays a role in their vulnerability status. This study will provide insight into factors that contribute to a species' endangerment. The information found in this project could be used as an early indicator to identify species that may become at risk for extinction.

Cultural Dualism in the Egyptian χώρα and the Downfall of the Lagid Dynasty, 300 B.C. – 200 B.C.

Jorge R. González García
Sponsor: Stylianos V. Spyridakis, Ph.D.
History

The third century B.C. was a crucial period of time during which the social standing of native Egyptians changed remarkably. This research focuses on the socio-economic, religious, political, and military factors that the countryside or χώρα provided to the rural population, which, in comparison to urban centers, allowed for a more fluid social mobility. After the Battle of Raphia in 217 B.C., which put an end to the Fourth Syrian War, for example, a considerable percentage of Egyptians in the χώρα exercised Hellenistic cultural practices at different levels, from adopting Hellenic names, to participating in the γυμνάσιον. Moreover, the spreading of Greek culture and language is manifested in the acquisition of bureaucratic offices such as tax collection and district administration, and even the attainment of higher military ranks. Therefore, based on careful analysis of third century B.C. Greek papyri, I argue that during this period of time, circumstances on the Egyptian χώρα triggered a remarkable transformation of the social conditions of native Egyptians, This resulted in an improved social standing, and consequently, to a stage of socio-political compromises for a decaying Ptolemaic Dynasty, in addition to new metaphysical perceptions and conceptions embraced by native Egyptians and their ethnically mixed-family compatriots.

Delineating Expression Patterns of Paneth Cell Products Across Early Development in C57BL/6 Mice

Stephanie M. Goley
Sponsor: Bo Lonnerdal, Ph.D.
Nutrition

Necrotizing enterocolitis (NEC) is a leading cause of morbidity and mortality in the neonatal intensive care unit. The underlying perturbations initiating inflammation within the immature intestine remain to be fully elucidated; however, various genetic and environmental factors (e.g., dysbiosis of the microbiota) have been investigated. Paneth cells are specialized epithelial cells located within the small intestinal crypt that produce an array of effector proteins, which demonstrate various protective functions (e.g., antimicrobial) within the lumen of the intestine. The objective of the current study is to investigate the developmental expression patterns of Paneth cell products using a C57BL/6 mouse model. Small intestine and colon tissue were isolated from mice at postnatal day 5, 10, 20, and 50 (adult). Using quantitative real-time PCR, we analyzed the expression of eight murine defensins (Defa 3, 5, 20, 21, 22, 23, 24, and 26), intelectin-1, lysozyme, metalloproteinase 7, REGIIIγ, and housekeeping genes GAPDH and β-actin. In proximal and distal small intestine, Paneth cell products were found to dramatically increase in expression during development and into adulthood; however, colonic expression was constitutive and at much lower levels. Our findings provide new insight into the developmental signature of Paneth cell products.

Elucidating the Roles of snoRNAs in *Snord116* Deficient Mouse Models to Identify Disease Mechanisms in Prader-Willi Syndrome

Ace Gonzalez
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Prader-Willi Syndrome (PWS) is a complex human disease. PWS affecting 1 in 10,000 to 30,000 individuals is characterized by hypotonia, feeding difficulties, poor growth, and development. At the onset of childhood, affected individuals develop hyperphagia and obesity leading to diabetes (type 2). PWS patients have moderate intellectual impairment, learning disabilities, and behavioral problems. Deficiency of the active paternal allele of 15q11-13 causes PWS. Normally most genes are inherited with two active alleles, one from the mother and one from the father. However, some genes like those in 15q11-13 are imprinted or epigenetically silenced when transmitted leaving one active gene copy. The 15q11-13 locus includes both coding genes and non-coding RNAs. However, previous studies indicate that the PWS critical region lies in the *SNORD116* cluster of small nucleolar RNAs (snoRNAs). Although *SNORD116* is important for normal growth and development, the mechanistic role of this noncoding RNA is not well understood. My portion of this project is to propagate, genotype, and phenotype the *Snord116* deficient mouse strain and cross with selected transgenic mice strains to be used as models in elucidating the roles of snoRNAs in *Snord116* and how it contributes to the disease process in PWS.

Embryonic Exposure to Silver Nanoparticles Disrupts Neural Development in Zebrafish and Impairs Swimming Ability Later in Life

Eduardo A. Gonzalez
Sponsor: Gary N. Cherr, Ph.D.
Environmental Toxicology

Silver nanoparticles (Ag-NPs), defined by their size between 1-100 nanometers, are highly used materials because of their applications as antimicrobial additives. However, their small size comes with unique physiochemical properties that may also increase toxicity. Because of this potential, the neurotoxicity of these particles was examined using zebrafish as a model system. Embryos were exposed to Ag-NPs from 24-72 hours post fertilization (hpf). A morphology assessment revealed abnormalities of spinal curvature and yolk sac edema appearing significantly beginning at 1 ppm (mg/L). Qualitative apoptosis staining showed that 5 ppm Ag-NP treatments had notably higher levels of fluorescence in the brain and head region than controls, suggesting increased levels of programmed cell death. After 3 recovery days in clean water, a behavioral assessment was conducted to measure swimming ability against a current. Even among the 5 ppm treatment larvae that showed no physical abnormalities, swimming was significantly impaired as measured by the amount of time spent being pushed downstream by the current. These findings indicate that even when there is no initial toxicity observed, Ag-NPs are capable of causing detrimental effects that arise later in the development process. Overall, this study demonstrates the wide neurotoxic potential associated with developmental Ag-NP exposure.

Mathematics in Gertrude Stein's "Q.E.D." and "Melanctha"

Grace Gordon
Sponsor: Colin Milburn, Ph.D.
English

What do a modernist writer and a mathematical philosopher have in common? Gertrude Stein (1874-1946), known for her many feminist works, utilizes mathematical concepts such as repetition, patterns, sequences, and abstraction in her writing. The mathematician and philosopher Alfred North Whitehead (1861-1947), an acquaintance of Stein's, philosophizes on the importance of abstract mathematics in his book *An Introduction to Mathematics* (1911). Stein reinforces Whitehead's views on the intricacies of abstract math in her short story "Q.E.D."(1903). The story describes a love triangle between three women, and serves as a verbal proof of the inadequacies of love. Many of the plot points and characters of "Q.E.D." reemerge in Stein's later short story entitled "Melanctha," from *Three Lives* (1906). In "Melanctha," mathematical structures, such as "fractals" (Guerra de la Torre, 1995), take the place of the explicit math references from "Q.E.D." My project will examine the differences between "Q.E.D." and "Melanctha," with regard to the mathematical concepts and structures in each text. By invoking Whitehead's mathematical philosophy as a lens for interpreting Stein's writing, I hope to analyze the stories as two different parts of a series, and unpack the significance of mathematics in Stein's feminist texts.

Preservation of TH Cell Morphology in Rat Retinae Through Use of Sucrose-Supplemented Fixatives

Aaron H. Gouw
Sponsor: Andrew Ishida, Ph.D.
Neurobiology, Physiology & Behavior

Our understanding of mammalian retina cell morphology can be limited by standard immunohistochemical fixation (preservation) techniques. This can complicate attempts to assess anatomical changes caused by retinal diseases or abnormalities. Our laboratory has found that commonly used aldehyde fixatives alter the shape and contour of retinal ganglion cells (RGCs) and that this can be avoided by replacing sodium chloride in these fixatives with sucrose. Although the effects of standard and sucrose-supplemented fixatives on RGC morphology are known, the same cannot be said for other types of retinal cells. As such, I hypothesized that the structure of dopamine-releasing, tyrosine hydroxylase-containing amacrine cells (abbreviated "TH cells") would be better preserved when the osmolarity of a fixative solution was increased, compared to standard fixatives, via the substitution of sodium by sucrose. Using immunohistochemical techniques and scanning laser confocal microscopy, I found that TH cells were better preserved through sucrose-supplemented fixation. Quantitatively, TH cells in sucrose-supplemented versus the standard fixed retinae had, on average, 2.89 versus 0.3 primary dendrites, respectively, with an average length of 102um versus 7.22um, respectively. These results suggest that this novel preservation technique can be used to provide a better understanding of the effect of diseases on cellular structure.

Characterization of Sunflower Core Clock Gene Function by Stable Transformation in *Arabidopsis thaliana*

Tatiana Gromova
Sponsor: Stacey L. Harmer, Ph.D.
Plant Biology

Plants and most living organisms possess an internal circadian clock that keeps time with the Earth's day/night cycle. This endogenous clock, which follows a roughly 24-hour cycle, is essential for the fitness of organisms. The plant clock is composed of a central oscillator which directs the processing of environmental inputs, mainly light and heat, producing specific outputs like regulation of overall plant metabolism, immunity, growth and development. The molecular nature of the plant central oscillator has been extensively studied in the model plant, *Arabidopsis thaliana*, and consists of several interlocking feedback loops. The morning loop comprises the morning expressed genes including MYB transcription factor LATE ELONGATED HYPOCOTYL (LHY). LHY function is central to the *A. thaliana* circadian clock. *A. thaliana LHY* mutants display short period and early flowering phenotype. Sunflower is an important agricultural crop, yet nothing is known about the genes that function in regulating its clock. Here we identify and functionally characterize a sunflower gene homologous to *A. thaliana LHY* by transforming the putative sunflower LHY genomic region into *A. thaliana* mutant. Our goal is to determine whether the sunflower homolog transformed into *A. thaliana LHY* mutant plant would restore its normal period and flowering time.

Real Time Tracking of Protein Synthesis and Assembly With Genetically Encoded Small Illuminant (GESI)

Tansy A. Gu
Sponsor: R. Holland Cheng, Ph.D.
Molecular & Cellular Biology

There are many probes and sensors used in molecular biology to track cellular activity such as the green fluorescent protein (GFP). Compared to the 238 amino acid long GFP, the genetically encoded small illuminant (GESI) is only 12 amino acids. GESI acts as a fluorogen activating protein (FAP) that can bind the dye malachite green (MG) to produce a fluorescent signal when excited by light of near infrared wavelength. GESI was cloned at the C terminus of hepatitis E virus (HEV) capsid protein gene and chimeric VLPs were produced in insect cells. The HEV-GESI VLP was used to visualize protein localization in cells and quantify protein content *in vitro*. MG binding to GESI was found to be highly specific as seen by immunostaining with capsid antibodies. Fluorescence intensity increased overtime when GESI VLP was incubated with MG on a Native-PAGE gel. GESI fluorescence is a good indicator of protein content as it correlated with absorbance 280. GESI was used to track viral production and protein synthesis in insect cells on different days post infection by subcellular fractionation. Using the GESI VLP, we plan to study protein folding and virus assembly in real time through fluorescence correlation spectroscopy.

Expression of Aphid Salivary Proteins Under Estradiol Inducible Promoter in Arabidopsis

Leandro Guerrero
Sponsor: Stacey L. Harmer, Ph.D.
Plant Biology

Aphids are among the most destructive crop pests. Utilizing specialized elongated mouthparts, called stylets, they puncture plant leaves and suck nutrients from the phloem while secreting saliva. Effectors are small molecules secreted by plant-associated organisms. They suppress plant defense responses and modify plant physiology to harbor the invaders and provide them with nutrients. While most effectors contribute to pathogen and pest virulence, plants have evolved mechanisms to detect some of these effectors and strengthen their defenses. Recently, it has been shown that effectors of aphid saliva play a role in modulating plant responses but their exact mechanisms are unknown. This project will characterize the function of two aphid (*Myzus persicae*) effectors. The effectors will be cloned in expression vectors with estradiol inducible promoter, tagged with human influenza hemagglutinin (HA) epitope at the C-terminal, and transformed into *Arabidopsis thaliana*. To study how these effectors function once inside the plant, transgenic *A. thaliana* plants will be sprayed with estradiol to induce effector expression. Using the HA-tag, the effectors will be purified along with any proteins attached to them. Understanding the mechanism(s) by which these effectors function could be useful in devising efficient methods to combat infestations by this economically important insect.

Structural Characterization of Xyloglucan Using Mass Spectrometry

Michael Guillermo
Sponsor: Carlito B. Lebrilla, Ph.D.
Chemistry

Xyloglucans and other hemicelluloses are examples of polysaccharides that are commonly found in plant cell walls. Unfortunately, current methods in polysaccharide characterization are not sensitive enough to elucidate the structural diversity that is necessary to study their structure-function relationships. Common methods focus on the monosaccharide composition and largely ignore the connectivities between sugar subunits. This project aims to determine the structure of Xyloglucan by comparing the oligosaccharide structures with their monosaccharide compositions. Samples first undergo Mild Acid Dissociation and Distribution of Oligosaccharide Groups (MADDOG), which cleaves the polysaccharide into oligosaccharides. Samples are then separated using preparative scale PGC-HPLC. Each fraction is split and undergoes two types of analysis. First, oligosaccharides are analyzed by Quadrupole-time-of-flight (QTOF) tandem mass-spectrometry to identify the connectivity of the oligosaccharides. Second, the monosaccharide compositions are analyzed by subjecting the oligosaccharides to acid hydrolysis followed by PMP (1-phenyl-2-methyl-5-pyrazolone) derivatization of the monosaccharides. These derivatized monosaccharides are then analyzed using a triple-quadrupole mass-spectrometer (QqQ) with dynamic MRM (multiple-reaction-monitoring). The oligosaccharide connectivity is obtained by tandem MS methods with the monosaccharide composition in order to determine the unique structure of each oligosaccharide. The methods presented will shine light on the structural features present in plant cell walls.

An Examination of Clock Dysfunction Associated With Disruption in the Insulin-Signaling Pathway of *Drosophila melanogaster*

Pedro A. Gutierrez
Sponsor: Joanna C. Chiu, Ph.D.
Entomology & Nematology

Disruptions in the circadian clock have been associated with many human health disorders, such as cancer, depression, and type 2 diabetes (T2D). Recent studies have illustrated the importance of O-linked glycosylation (O-GlcNAcylation) as a post-translational modification that regulates the function of key animal circadian clock proteins. We therefore hypothesize that the O-GlcNAcylation status of circadian clock proteins may be altered in patients with T2D, leading to co-occurrence of circadian disruption. Since T2D models have been developed in *Drosophila melanogaster* by disruption of the insulin-signaling pathway, and the regulation of circadian clock is quite conserved between humans and flies, we tested our hypothesis using *Drosophila* as an animal model. As daily locomotor activity rhythm is a robust output of the circadian clock, we assayed activity rhythms of T2D flies to examine the functionality of their clock. Acquiring a clearer understanding of clock disruptions associated with diet, nutrition, and metabolism may lead to development of new therapy for clock and metabolic disorders.

Gender Difference Amongst Young Children Prosociality: Cultural or Social?

Stephanie Guzman Alvarez
Sponsor: Ross A. Thompson, Ph.D.
Psychology

There has been research conducted to see whether infants have a preference in prosocial individuals over antisocial ones. I am focusing my research in prosocial task in young children at the UC Davis Social and Emotional Lab, where we used different types of tasks to measure prosociality in children. I examine how sociocultural differences affect how a children responds to prosocial tasks. Pro-sociality means that a child will help an individual who is in need of help without being told to do so. Previous research has observed that children are more likely to help prosocial individuals (Hamilton & Wynn 2011). My goal is to see how gender affects pro-sociability and to see if there is a sociocultural relationship between these two. For this study we recruited 62 toddlers ages (4-5) from the Davis and Woodland area and came in for a 1 hour lab session where the child spend time with an Research assistant participating in different tasks; like Òdrop markerÓ task where an actor drops markers and begins to pick them up, hoping the child will help to pick them up. The children's response will helps us understand the relationship between gender and pro-sociability.

Self-Presentation in Online Dating Platforms: How Users' Self-Disclosure is linked to Gender, Personality, and Perceived Success

Daniel M. Haddad
Sponsor: Jorge Peña, Ph.D.
Communication

The use of online dating apps and websites for individuals to form romantic relationships has steadily increased over the last few decades. A vast majority of individuals from all ages and demographics are turning to such method and has shown to be effective. For instance, over one-third of all marriages in the U.S. between 2005–2012 were a result of online dating experiences (Cacioppo et al., 2013). This study expands and replicates previous research investigating the link between users' self-disclosure and their relational success in online dating. This study also explores how personality, relational goals (e.g., seeking short or long term relationships), and gender affect online dating behaviors. The results are based on a sample of approximately 1,000 UC Davis students, and the findings are linked to computer-mediated communication theories in order to shed light on the use of online dating technologies, as well as how young people transition from online communication to a face-to-face interaction.

Using MeCP2 Chromatin Immuno-Precipitation Sequencing to Identify the Binding Sites of MeCP2 Proteins

Quang Minh Ha
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Rett syndrome is an X-linked neurological disorder characterized by developmental regression around 6-18 months of age, reduced brain function, hypotonia, skeletal deformities, ataxic hand movements, seizures, and irregular breathing patterns. It occurs in around 1:10,000 births and occurs mainly in females. Rett syndrome is caused by the mutation of the gene *MECP2* encoding the transcription factor Methyl CpG Binding Protein 2 (MeCP2). The location in which MeCP2 binds chromatin throughout the genome, however, is not well characterized. Previous MeCP2 Chromatin Immuno-Precipitation sequencing (ChIP-seq) produced ambiguous peaks all over the genome. Therefore, we have designed a new pathway to identify the sites in which MeCP2 proteins bind to the genome. In my project, I will cut chromatin from the human cell line, SHSY-5Y into small fragments of around 150 base pairs. The small fragment size will help better identify the specific binding sites. Then I will use MeCP2 ChIP to isolate the chromatin fragments that are bound by MeCP2. In the next step, these fragments will be used to make libraries and sent to high throughput illumina sequencing. The collected sequences will be aligned with original genome of human cell line SHSY-5Y to identify the binding sites of MeCP2 proteins.

Examining Childhood BMI as a Function of C-Reactive Protein

Mariam Hameed
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

Characterizing levels of inflammation may help elucidate mechanisms of obesity development in childhood; high concentrations of inflammatory marker C-reactive protein (CRP) are strongly associated with higher body mass index (BMI) in adults, as adipose tissue influences the release of inflammatory markers into the blood (Tam et al., 2009). During childhood, BMI percentile is positively associated with age, increasing each year due to growth and development; BMI percentile also differs by gender, as girls tend to show higher BMI than boys starting from ages 5–7 (CDC, 2015). However, the relationship between BMI and CRP has not been extensively examined in children, though CRP is a potential indicator of child's weight status. We hypothesize that CRP levels will predict BMI after controlling for age and gender. The current study uses data from the UC Davis Healthy Kids Study, with a subsample of low-income children (ages 2–6) from California Head Start and WIC Programs (n = 32). Children's height and weight were measured and used to calculate BMI percentile based on CDC growth charts. CRP, obtained from fasting blood, was measured by immuno-chemiluminescence. We will use multiple regression with CRP predicting BMI, controlling for age and gender to address our hypothesis.

From Germany to England: Edgar Taylor's "German Popular Stories" and the Rise of the Fairy Tale as a Literature for Children

Amy L. Hanak
Sponsor: Alessa Johns, Ph.D.
English

This study analyzes the transformation of literary folklore from a medium largely concerned with adult themes, to topics specific to a juvenile audience. Considering the socio-historical and political forces in nineteenth-century England, I trace the progression of fables and fairy tales as they are translated vis-à-vis various forms of publication. In particular, I examine the movement of three "Bluebeard-tale" types from the first edition of the Grimms' *Kinder-und-Hausmaerchen* (KHM): "Bluebeard", "Fitcher's Bird" and "The Robber Bridegroom" as they are translated into England by Edgar Taylor in 1823. Taylor's translation, *German Popular Stories*, was significant because his heavy-handed re-writing and selective translation of tales from the KHM were motivated by his intention to create and publish a literature specifically for children. In contrast, the Grimms, whose first edition of the KHM (despite the deceptive nature of its title), was written for an audience of academic peers. It was subsequent to the successful publication of Taylor's translation of the KHM that the Grimms rewrote their tales to reflect the concerns of a juvenile audience. This study will focus on the intertextual "re-tellings" of the genre and the forces that re-shaped it from an adult to a child-centric model.

Differential Expression of Paneth Cell Alpha Defensins in Response to SIV Infection

Ronald J. Hart
Sponsor: Sumathi Sankaran-Walters, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Defensins, small antimicrobial peptides, are essential components of innate immunity in the GI tract and are important in maintaining the integrity of the gut mucosa as a barrier to infection. While many rhesus enteric defensins (REDs) have been identified, little is known about the factors that govern their activity. Here, we hypothesize that individual REDs have distinct roles in the gut in response to viral and bacterial infections. To investigate, SIV positive and negative rhesus macaques underwent ligated ileal loop surgery where individual intestinal compartments were inoculated with either pathogenic *Salmonella Typhimurium*, or commensal *Lactobacillus Plantarum*. The levels of 4 REDs were determined in different parts of the GI tract using immunohistochemistry and real-time PCR. We found that RED 2 and RED 4 had the highest levels of expression in the ileum and showed large changes during SIV infection. In contrast, RED 15 and 16 showed the highest expression in the jejunum. Additionally, loops inoculated with *S. Typhimurium* had higher levels of RED 2 expression than loops inoculated with *L. Plantarum*. These results suggest regional specialization of REDs and differential roles in the context of viral and bacterial infection that may provide the background for future research against HIV-induced enteropathy.

Relationships and Gender Constructions in Adolescent Films

Deborah J. Hasen-Klein
Sponsor: Elizabeth Constable, Ph.D.
Gender, Sexuality, and Women's Studies

Film Studies and feminist Scholars, including Celeste Kearney and Ann Anderson have examined how mainstream young adult cinema in the US tends to portray teenage relations in limited and often unrealistic ways. In turn, they analyze the negative impacts such portrayals have on the way teenagers think about their lives. But, as the independent adolescent film genre emerges and gains a following in the 2010's, in *The Perks of Being a Wallflower* (Stephen Chbosky, 2012), *Stuck in Love* (Josh Boone, 2012), and *Me, Earl, and the Dying Girl* (Alfonso Gomez-Rejon, 2015), portrayals of teenage relationships are shifting, focusing on emotionally intimate friendships, more realistic romantic relationships, and changing gender constructions. How do these films change the way we understand teenage relations? How do their on-screen platonic friendships between teens of different genders allow departures from gendered norms? My research examines the ways these independent films differ from mainstream teen cinema like *Mean Girls* (Mark Walters, 2004) or *Easy A* (Will Gluck, 2010), which promote unhealthy romantic relationships and friendships. Focusing on these films, supplemented by survey data, I determine to what extent these independent films alter teenage perceptions of 'allowed' relationships.

Falsification and Its Use in Modern Research

Megan Haugland
Sponsor: Thomas R. Gordon, Ph.D.
Plant Pathology

Karl Popper, an Austrian-British philosopher, believed scientists should attempt to falsify hypotheses rather than seek to prove them. Although proving a hypothesis might seem more interesting, scientists cannot take conclusions from their studies and declare it true for all cases. It takes one occurrence to falsify a statement and there is no way to test all occurrences. By falsifying a statement, scientists can report new information without drawing conclusions based on inductive reasoning. To determine how often scientists follow Popper's recommendation, I categorized research papers on malaria based on whether or not: 1) a hypothesis was stated and 2) the research team attempted to falsify their hypothesis. I hypothesized myself that falsification would not be a frequent objective. I found the following in my preliminary data: 8 of 18 did not have a clear hypothesis, 2 of 18 falsified their hypothesis or inferred hypothesis, and 4 of 18 attempted to challenge a current belief. Although a knowledgeable research team and well-designed study increases the likelihood of results supportive of a hypothesis, it is interesting that not many studies follow the logic of Popper. Further research is needed before these data could be used to re-examine the structure of research studies.

Open-Identity Sperm Donation: Interest in Others Who Share Your Donor

Kaitlin R. Haupt
Sponsor: Joanna E. Scheib, Ph.D.
Psychology

In donor insemination (DI) programs, multiple families are often formed with the assistance of the same anonymous sperm donor, thus genetically-linking children across families. DI families are increasingly open about their origins and seeking contact with other families who share their donor ("donor-linked"). Among donor-linked families who make contact with each other, the majority report positive experiences (Freeman, Jadva, Kramer, & Golombok, 2009; Goldberg & Scheib, 2015). In contrast to anonymous donation, open-identity donation enables offspring, at age 18, to identify their donor and learn more about their origins. It is not clear whether these adults will still be interested in contacting others who share their donor. Using semi-structured interviews, we examined interest in donor-linked others among 30 adults who have identified, and sometimes contacted, their donor. While 13 reported interest, 14 adults had already contacted at least one donor "half-sibling." Motivations for contact included (i) curiosity about shared traits, (ii) sibling-relationship potential, (iii) connecting through shared experiences, and (iv) less pressure than contact with donor. Additional analyses will include the effects of family structure and size. Findings suggest that interest in donor origins extends beyond the donor, and that linked others hold the potential for a unique relationship.

Romance Comic Books and Magazines: The Cold War, Anti-Feminism, and Teaching Women Their Place

Sydney M. Heifler
Sponsor: Kathryn Olmsted, Ph.D.
History

In 1947, Prize Comics published Captain American creators Joe Simon and Jack Kirby's first issue of *Young Romance*. *Young Romance* established romance comic books as a popular genre in the early Cold War era. The African American publishing industry took notice of the increasing prevalent topic of romance in popular print. In 1950, African American entrepreneur John Harold Johnson published the first issue of *Tan Confessions*. *Tan Confessions* established the African American romance magazine in popular print. Current scholarship ignores to what extent governmental and professional influence and social pressures affected the creation of these publications. Despite the belief that publishers created these comics and magazines to entertain and reflect real struggles of their intended demographics, both romantic subgenres became propaganda that targeted women to shape their viewpoints about their role in society. Through plotlines, romance comic books instructed young white women about their sexual and social roles in America by reflecting anti-feminist commentary. Through supposed true stories, African American romance magazines conveyed that minority women possessed an inherent, unfit nature rendering them unable to participate in the American domestic ideal. This evidence redefines current discourse concerning these publications and emphasizes their role in influencing social norms.

Under Pressure: Effects of Parental Pressure on Children's Fruit and Vegetable Consumption and the Energy Density of Their Diets

Hayley A. Heino
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

As of 2011-2014, 26.4% of children ages 2-11 years were obese (Ogden et al. 2015). Many studies have investigated the effect of parental feeding practices on children's BMIs. For example, pressure to eat was defined by Gregory et al. as parents insisting their children consume more healthy foods or increase their overall intake. A 2011 study by Hurley et al. found that pressure to eat was negatively associated with BMI in preschool and elementary school-aged children. Others have examined the relationship between pressure to eat and fruit and vegetable consumption (FVC) in preschoolers (Blisset, 2011), but none have investigated overall caloric intake. The current study will explore the effects of pressure to eat on FVC and energy density among preschoolers. We hypothesize that pressure to eat will increase FVC and decrease energy density of children's diets. Controlling for energy density, a multiple regression model was used with pressure to eat predicting FVC. Responses reflecting pressure to eat from the My Child at Mealtime questionnaire (Ontai et al. 2010), administered to 130 parent-child pairs in the Sacramento area WIC or Head Start programs, were aggregated onto a scale. Energy densities were obtained from 24-hr recalls and FVC was measured in cups.

Dietary Intake of Iron Among School-Aged Children: Does Intake Vary by Weight Status?

Mariana L. Henry
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

Iron deficiency is one of the most common nutritional deficiencies in the United States of America, the most common cause of anemia, and a recurring issue in American children. Iron is essential for optimal child development since children who are iron deficient face adverse health outcomes. Associations have been found between high body mass indices (BMIs) and iron deficiency. Possible causes for the high prevalence of iron deficiency in overweight and obese children are inflammation, increased growth needs, and low dietary iron intake. Previous research has not thoroughly examined dietary intake of iron in relation to obesity. This study will examine the percentage of overweight and obese children who meet the estimated average requirement (EAR) for iron in comparison to their peers with a healthy body mass index. This sample was drawn from fourth graders enrolled in the Shaping Healthy Choices intervention study in Fall 2014 (n = 311). A food frequency questionnaire was used to assess dietary iron intake and divide participants between those who met the EAR and those who were below it. While on average 13-15% of participants had intakes under the EAR, chi-square analyses did not reveal significant differences by weight status.

Factors Underlying Fruit and Vegetable Consumption in College Students

Angelica M. Hernandez
Sponsor: Lisa S. Miller, Ph.D.
Human Ecology

Fruit and vegetable intake has been associated with decreased risk of diet-related chronic health conditions, yet college students are not consuming enough. Past research has shown that food label skill is related to overall dietary quality, and specifically fruit and vegetable consumption. However, there are still individuals who understand food labels but have poor quality diets indicating that food label skill may not be enough of a factor to determine fruit and vegetable consumption. In this study, our goal was to examine the possible moderating role of motivation on the relationship between food label skill and fruit and vegetable consumption in college students. College students (n=57) completed measures of fruit and vegetable intake, food label comprehension, and motivation. We found that higher food label skill was associated with higher intake of fruits and vegetables in college students, and that this relationship was moderated by motivation. Specifically, findings showed that increased food label skill is associated with higher fruit and vegetable consumption but only among those who are motivated. Findings may pave the way for understanding how to increase fruit and vegetable intake in the college student population, and in preventing diet-related chronic health conditions.

Trying to Understand Mass Shootings in the United States

Katherine C. Hill
Sponsor: Richard W. Robins, Ph.D.
Psychology

Mass shootings (i.e., more than 3 deaths of non-relatives) are of obvious societal importance and have been increasing over the past 50 years. There has been a lot of discussion about possible causes in the popular media, however there is very little research on this topic. The current project examines factors associated with mass shootings using the ÒStanford Mass Shootings in AmericaÓ data, courtesy of the Stanford Geospatial Center and Stanford Libraries. This is a carefully curated dataset that compiles information from news reports. Results show mass shootings have been increasing at a rapid rate ($\beta = .63$) and 42.9% of shootings since 1966 have occurred in the past 5 years. Only 50.3% of these incidents involved individuals with a history of mental illness. The average number of victims in any given mass shooting was 8.94 people. Almost every mass shooting was carried out by a male (97.6%), and 87.7% of shooters worked alone. Further results will illustrate how factors such as type of gun(s), motivations, and location improve our understanding of mass shootings. These results demonstrate the need for more research on mass shootings and what factors are involved, in order to understand how to prevent future occurrences.

Is “Hey Sexy!” a Compliment or Harassment? Interpretations of and Experiences With Street Harassment

Jennifer Herrera
Sponsor: Bill McCarthy, Ph.D.
Sociology

Street harassment is an international legal and human rights issue that, until recently, has gained little recognition in the public dialogue. This study strives to understand contrasting perspectives of street harassment in the United States by asking women and men if they view remarks like “Can I get a smile” or gestures such as blowing a kiss as acceptable ways of greeting others, compliments, flirtatious gestures, or forms of harassment. It explores the behaviors women and men see and experience in their gendered interactions with strangers in public spaces, such as the streets or pedestrian pathways. Examples of gendered interactions include making verbal remarks like “Hey Sexy”, non-verbal gestures such as kissing noises, or physical gestures such as touching. The study will also examine associations between definitions of street harassment and factors such as occupation, sexual orientation, and age. Data will be gathered from four locations: Richmond, Oakland, Davis, and Sacramento. Participants will be recruited through systematic random sampling. The survey instrument has thirty-four questions with structured Likert-scale responses and three interview questions. The survey and interviews will be conducted in English and Spanish. Ultimately, this research will draw implications for gender inequality and women’s safety in public spaces.

Promoting Bicultural Health Competency Through an Investigation of Vaccination Opinions in Mexico and California

Kevin R. Hill
Sponsor: Yvette G. Flores, Ph.D.
Chicana & Chicano Studies

While vaccinations have significantly reduced the incidence of many infectious diseases in the United States, immunization rates for certain vaccines still fall below acceptable levels and are causing outbreaks (Sifferlin, 2015). Furthermore, Latino children have lower vaccination rates than non-Latino White children for 6 out of the 9 vaccinations recommended by the CDC (Elam-Evans et al., 2014). The primary goal of this study is to understand the potential role that personal biases may play in these racial disparities, in addition to demographics within these racial groups that may harbor negative sentiments about vaccines. To investigate this, 600 surveys were conducted in Oaxaca, Mexico and throughout California using in-person, written, and online platforms. Survey respondents offered their opinions regarding the efficacy and safety of vaccines, in addition to demographic information. The questions were Likert scale and open-ended in order to obtain both quantitative and qualitative data. Initial findings indicate that while opinions are largely positive, negative beliefs are slightly more abundant in the Mexican survey population. Based on these results, it is important for clinicians in California to be mindful of biases that recently immigrated Mexican Americans may have towards vaccines.

Surface Microscopy Study of the Effects of Temperature on the Surface of Krypton Intercalated Graphite

Nur Syazana Natasha Hisham
Sponsor: Shirley Chiang, Ph.D.
Physics

The structure and properties of surface atoms differ radically from those of atoms in the bulk of a solid material. However, optical microscopy cannot be used to resolve atomic structure because the average wavelength of visible light is about 2000 times greater than the diameter of a typical atom. Hence, more advanced instruments such as the scanning tunnelling microscope (STM) and low energy emission microscope (LEEM) can be employed for high resolution imaging of solid surfaces. STM allows determination of the atomic-scale surface topography, while LEEM enables the study of the dynamics of surface structural phase changes. This talk describes the principles of STM and LEEM for surface imaging and shows STM images of highly ordered pyrolytic graphite (HOPG). Krypton atoms sputtered onto the graphite intercalate under the top layer, and the properties of these samples are closely related to those of single-layer two-dimensional graphene, which won its discoverers the 2010 Nobel Prize in Physics. STM imaging was used to investigate the surface structural changes when the graphite samples were heated to 873K, resulting in ultrahigh pressure of the intercalated krypton.

Processing Induced Anomalous Superconductivity in Spark Plasma Sintered Bulk YBCO

Lixian Huang
Sponsor: Subhash H. Risbud, Ph.D.
Chemical Engineering & Materials Science

Yttrium barium copper oxide (YBCO) has been widely investigated as a high-temperature superconducting material. In previous studies, rapidly consolidated YBCO was reported to have decreasing resistivity at above 240K and up to 300K. Based on previous results, YBCO samples should be consolidated in less than 15 min to achieve full density and the observed resistivity drops. The goal of this current project is to further investigate the unusual conductivity behavior of spark plasma sintered YBCO with a superconducting quantum interference device (SQUID) and a magnetic property measurement system (MPMS). Spark plasma sintering (SPS) is well-known for sintering ceramic powders faster than sintering in a conventional furnace. Thus, YBCO bulk samples were prepared by SPS in vacuum conditions in the temperature range 600-900°C under constant pressure and later annealed in an oxygen atmosphere. X-ray diffraction was used to determine the crystal structure and phase changes of the sintered samples and the relationship between long moment values and temperatures was analyzed by MPMS measurements. Data on phase changes observed after SPS processing are presented.

The Search for Dark Matter at CMS Using the Higgs Boson

Jessica Howard
Sponsor: John Conway, Ph.D.
Physics

Direct detection of Dark Matter (DM) is one of the most elusive areas of physics research today. Due to the fact that DM appears to only interact gravitationally, it is extremely hard to detect directly. However, because of its ability to interact gravitationally, it is expected to interact readily with the recently discovered Higgs Boson. The Compact Muon Solenoid (CMS) particle detector is capable of detecting such events during the current run of the Large Hadron Collider (LHC), which houses CMS. During the investigation of these events of interest, unwanted background events have made it difficult to detect DM with good statistical significance. The largest contributor to these backgrounds are W+Jet events. Prior methods used to reduce W+Jet events would also eliminate DM events. This presentation examines new methods of background reduction. Using simulated data from DM and W+Jet events, the validity and efficacy of these proposed background-reduction methods will be demonstrated, and the current state of this analysis on data will be shown.

Evaluation of Direct PCR for Quantification of Plant-Inhabiting Bacteria

Nanxi Huang
Sponsor: Richard Jeannotte, Ph.D.
Plant Sciences

The PCR method is a widely used technique to amplify small segments of DNA for molecular and genetic analyses. However, this method can be time-consuming and costly due to the need for DNA extraction from tissues prior to PCR. This problem could potentially be mitigated by the application of direct PCR, a method that allows for DNA amplification via PCR using unpurified samples. The aim of this study is to validate the use of a direct PCR method from KAPA Biosystems for amplifying the gene encoding 16S ribosomal RNA (rRNA) of bacteria living on different maize plant tissues. Specific bacterial primers developed for samples rich in plant DNA will be used. Maize plant tissues will be inoculated with various quantities of bacteria. The DNA from the plant tissues will then be extracted or the tissues will be directly used for 16S rRNA PCR assay. The method will be validated by comparing the number of bacteria inoculated detected using both approaches. If successful, direct PCR could be a more time-efficient and cost-effective alternative to conventional PCR of pure DNA extracts.

Reconstruction of Prehistoric Protein Consumption Patterns Using Stable Isotope Analysis

Bryna E. Hull
Sponsor: Jelmer W. Eerkens, Ph.D.
Anthropology

Human skeletal remains offer a means for archaeologists to study the subsistence patterns of past societies. Because bones are synthesized from nutrients in digested foods, and because bone is constantly remodeling, the stable isotopes found within bone represent a snapshot of the last 5–15 years of an individual's diet. By extracting collagen from bone and performing stable isotope analysis, the ratios of $^{15}N/^{14}N$ and $^{13}C/^{12}C$ express the trophic level of the dietary protein source and allow for differentiation between marine and terrestrial consumers. In this study, stable isotope analysis of bone collagen is employed to reconstruct the subsistence patterns of protein consumption of burial populations from three archaeological sites excavated in 1970's in Tuolumne County, CA. The $^{15}N/^{14}N$ and $^{13}C/^{12}C$ data for individuals is compared among the sites, between the sexes, and between age groups to evaluate differences in paleodiets. The data is also paired with radiocarbon dates to examine changes over archaeological time. Preliminary results suggest that the subsistence pattern of these individuals is unique when compared to other prehistoric Native American populations of central California, suggesting a unique central Sierran diet, but that differences between the sexes and between age groups is minimal.

The Insulin Receptor Complexes With the B2AR Primarily Through the C-Terminal Tail

Benjamin Hung
Sponsor: Kevin Y. Xiang, Ph.D.
Pharmacology
School of Medicine

Two debilitating diseases, Diabetes Mellitus Type-2 and cardiovascular disease (CVD) are serious quality of life issues for the aging population. Furthermore, diabetic patients are three times more likely to develop CVD. It has been demonstrated in a previous Xiang laboratory study that the Insulin Receptor (IR) complexes with the B2-Adrenergic Receptor (B2AR) within cardiomyocytes. GRK2, a downstream target recruited by IR, is known to phosphorylate the B2AR leading to Gi signaling for decreased cardiomyocyte contractility. The proximity of B2AR to IR makes it a prime candidate for GRK2 phosphorylation. We hypothesize that the interaction between IR/B2AR can be disrupted at the GRK2 phosphorylation site of B2AR. Preliminary in-vitro reconstitution data using purified human IR cytosolic domain and B2AR shows that there is a direct interaction. In order to test whether the GRK2 site is responsible, binding assays between B2AR truncations and hIR cytosolic domains will be used to determine which amino acid residues are responsible. By understanding how IR/B2AR interact, a synthetic peptide mimicking the B2AR binding site can be used to release B2AR from the complex, thus preserving its signaling pathway resulting in normal cardiomyocyte contractility.

Cultural Success Factors in Major League Soccer

Dezmon A. Hunter
Sponsor: Jeanette B. Ruiz, Ph.D.
Communication

As professional sporting leagues increasingly recruit players from various cultures, the analysis of intercultural communication could be a critical component to understanding how informational flow affects team success. The goal of this study is to gauge the performance of a team based on its cultural diversity. This study uses data from Major League Soccer (MLS), a football league located in the United States. The data will be acquired using www.import.io, an online web scraping tool, by extracting player statistics from MLS club websites. Using social network analysis, two competing hypotheses will be tested. The first hypothesis suggests that teams with greater cultural diversity will perform better. This performance benefit might be due to a greater availability of diverse information from the players. The competing hypothesis advocates that teams with greater cultural homogeneity will perform better, with the argument that players that are more similar tend to have greater trust and coordination.

Fearfulness in Dairy Calves: Assessing Repeatability of the Startle Response

Jill Huynh
Sponsor: Cassandra Tucker, Ph.D.
Animal Science

Fear, a negative-emotional state, and its analogous personality trait, fearfulness, have received much attention in response to animal welfare concerns. Fearfulness is a consistent behavioral and physiological response displayed by an individual to a perceived threat. Valid measures of fearfulness must therefore also be consistent over time. Although numerous studies have analyzed fear in rodents, there is a lack of research assessing the validity of these tests in farm animals. We assessed the validity of the startle reflex, a ubiquitous, cross-species reaction to a sudden stimulus that is modulated by fear, as a personality test in dairy calves by determining whether its behavioral and physiological elements are repeatable over time. Behavioral measures (latency to feed and magnitude of the startle response) and heart rate as a physiological measure were recorded in response to a sudden acoustic stimulus. We predict that both types of measures will be repeatable within individuals, and a correlation between behavioral and physiological components will exist. Evaluating the validity of the startle response as a personality test in calves will further animal welfare science by exploring novel ways to reliably quantify fearfulness in farm animals and more effectively manage fear caused by routine husbandry procedures.

Characterization of a New Genomic Instability Mechanism: Multiple Invasions-Induced Rearrangements

Abou Ibrahim-Biangoro
Sponsor: Wolf-Dietrich Heyer, Ph.D.
Microbiology & Molecular Genetics

Homologous Recombination is a DNA double-stranded break repair mechanism that uses an intact homologous molecule as a template for repair. To identify this donor sequence, hundreds of nucleotides flanking the break are exposed during a "resection" step. Rad51, the core yeast recombinase, coats the resulting single-stranded DNA, forming a nucleoprotein filament. This filament then browses the genome to find a match during the "homology search" step. Once identified, the donor homologous region is invaded, forming an intermediate "displacement loop", or D-loop. DNA synthesis can then occur, restoring the sequence information lost at the break. "Homology search" operates along the resected DNA molecule and a single nucleoprotein filament can invade multiple donor molecules, as shown in reconstituted reactions *in vitro*. Our goal is to detect multiple invasions *in vivo*, identify cellular factors regulating their formation and stability, and study the impact of faulty processing on genomic stability. I provide evidence for a new genomic instability mechanism: multiple invasion-induced chromosomal translocation. Length of homology and physical proximity of the donors positively correlate with the translocation frequency. Furthermore, translocation is inhibited by Sgs1 and Mph1 helicases activities and redundantly promoted by the Mus81, Slx1 and Yen1 nucleases, which incise the donors upon invasion.

Hop1 Site-Directed Mutagenesis

Stegi E. Ilanthiraian
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

SUMO (Small Ubiquintin-like Modifier) is a critical post-translational modification that modulates protein stability and function. SUMOylation is involved in many cellular process such as DNA damage repair and cellular signaling. A goal of our lab is to determine how SUMO plays a role in meiotic recombination, a highly specialized cell division cycle that produces gametes. Our lab recently performed a mass-spectrometric screen to identify proteins that are SUMOylated during meiosis. One such protein is Hop1, a component of the synaptonemal complex (SC) that facilitates meiotic recombination and checkpoint signaling. The goal of our project is to determine whether SUMOylation of Hop1 is important for its many meiotic functions. We will use site-directed mutagenesis to mutate all 13 lysine residues on budding yeast Hop1 that were found to be SUMOylated. In these strains, we will study recombination, spore viability, and meiotic efficiency to investigate if Hop1 SUMOylation is necessary for proper meiosis.

Regulation of TORC2 and the Role of Complex Sphingolipids During Caloric Restriction Induced Autophagy in *S. cerevisiae*

Elizabeth Iliuta
Sponsor: Ted Powers, Ph.D.
Molecular & Cellular Biology

Autophagy is a conserved catabolic process whereby nonessential or damaged cytosolic components are degraded and recycled in order to maintain homeostasis and cell quality. Dysregulation of autophagy is linked to metabolic and neurodegenerative diseases, including cancer, Parkinson's, and Alzheimer's disease. Previous work has shown that the rate and degree of autophagy activity are controlled by nutrient availability. Multiple pathways have been demonstrated to regulate autophagy, including the Target of Rapamycin (TOR) kinase pathway, a conserved nutrient-sensitive regulator of cell growth. TOR kinase forms two distinct complexes: TOR Complex1 and TOR Complex2 (TORC1 and TORC2, respectively). We have demonstrated the induction of autophagy during low glucose conditions, or caloric restriction (CR), in *S. cerevisiae*. More specifically, our focus has been on the role of the TORC2 signaling network, observing that inhibiting TORC2 signaling or sphingolipid biosynthesis, a target pathway downstream of TORC2, leads to defects in CR-induced autophagy. Thus, we concluded that TORC2-mediated regulation of sphingolipids is necessary for autophagy during caloric restriction.

Natural Pseudotyping of HIV-1 With HTLV-2 Expands HIV-1 Tropism to Lower Female Genital Tract Epithelial Cells

Brian S. Imbiakha
Sponsor: James Hildreth, M.D.,Ph.D.
Molecular & Cellular Biology

HIV is a RNA retrovirus that can be transmitted via exchange of bodily fluids during sexual intercourse. Studies of HIV-1 mechanism of entry suggest that the virus needs a CD4 receptor and either a CCR5 or CXCR4 co-receptor to gain entry into the target cells. Expression of this combination of receptors is limited to CD4 T cells, macrophages, and dendritic cells. These HIV-1 target cells localize in the sub-epithelial layer of the vagina and cervical tract and are separated from HIV-1 in genital secretions by the epithelial layer lining the surface of the cervix and vagina. Although the epithelial physical barrier "normally" prevents sexual transmission of HIV-1 among women, a high prevalence of HIV-1 has been seen in young women in Southern Africa and other world regions. We have demonstrated that co-infection of HIV-1 with the gammaretrovirus xenotropic murine leukemia virus-related virus or the human T-lymphotropic virus type-1 (HTLV-I) in T-cells resulted in HIV-1 incorporation of heterogonous envelope glycoproteins, a process called "Natural Pseudotyping". This expands HIV-1 tropism to primary epithelial cells. We hypothesize, the co-infection of HIV-1 and human T-lymphotropic virus type 2 (HTLV-II) Will resulted in production of naturally pseudotyped HIV-1 capable to infect epithelial cells.

Effect of Partial Replacement of Murine Troponin I With Human Troponin I in a Mouse Model

Tuleagh Innes-Gawn
Sponsor: Aldrin V. Gomes, Ph.D.
Neurobiology, Physiology & Behavior

Across species, the presence or sequence of each protein differs based on the need of the animal. If an animal were made to express a protein from another species, this may disrupt the normal functions of other interacting proteins which could lead to significant physiological changes. In my experiment, I aim to analyze the effects of expressing human cardiac troponin I (a protein that plays a major role in muscle contraction) in mice and to discover which proteins have changed expression levels compared to those in mice that have not been genetically modified. Heart samples from four non-transgenic mice and four mice expressing human cardiac troponin I were utilized. Proteins isolated from each heart were quantified, digested with trypsin, and labelled with different Tandem Mass Tags (TMTs). The different labelled heart samples were then combined and fractionated using high pH reverse phase fractionation. The fractionated samples were then analyzed by liquid chromatography mass spectrometry. The mass spectrometry data will be analyzed using Scaffold and used to identify differences in protein levels between the two groups of mice. Based on these differences, inferences about differences in function between human and mouse cardiac troponin will be made.

Translational Pharmacokinetic Analysis of Intravenous, Intramuscular, and Intraosseous Tranexamic Acid

Xenia Ivanova
Sponsor: Nam K. Tran, Ph.D.
Pathology & Laboratory Medicine
School of Medicine

Tranexamic acid (TXA) is an anti-fibrinolytic drug that prevents blood loss by inhibiting plasminogen from destroying the fiber matrix of a clot. The drug has been shown to significantly improve outcomes in trauma and combat casualty care settings. Currently TXA is administered orally and intravenously (IV), but both administration routes have disadvantages. When administered orally, TXA is slow to absorb and produces low peak concentrations. Intravenous injections, although rapid, are difficult to preform when vascular access is limited (e.g., traumatic amputations, burn injury). Alternative administration routes such as intraosseous (IO) and intramuscular (IM) administration could solve some of the aforementioned complications and be applied for unique environments such as combat casualty care. Unfortunately, these routes of administration have not been well studied. Intraosseous administration can be accomplished more rapidly with less training. Similarly, Intramuscular administration does not require vascular access and has a large volume of distribution, leading to longer drug retention times. This study aims to compare the pharmacokinetics (PK) of IV, IO and IM TXA administration using established translational animal models of hemorrhage. Results of our PK study will enable translation of TXA dosing strategies to humans and define optimized regimens for trauma and combat casualty care.

Factors Influencing the Survival of *Bifidobacterium longum* subsp. *infantis* in the Built Environment

Radhika Iyer
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Bifidobacteria are a group of anaerobic microbes found in the infant gastrointestinal tract that aid in the development of immune response and increase resistance to some gastrointestinal infections. However, the mechanism by which infants acquire this anaerobic bacteria is poorly understood. Hypotheses on the route of transmission include transferal from the mother or from other infants, possibly via human-built environmental features. The length of time that bifidobacteria can persist outside the gastrointestinal tract and what conditions favor its transfer are important factors to consider when evaluating these hypotheses. In this study, cultures of a model species of bifidobacteria (*Bifidobacterium longum* subsp. *infantis*) were exposed to an array of environmental conditions and assayed for viability at regular time intervals to define which parameters hinder, or aid, its survival. Preliminary results showed that bifidobacteria survived longer at colder temperatures and can survive extracorporeally for up to two weeks. Continued research will provide further insight into which factors aid the survival and transmission of bifidobacteria.

The Implications of Large Windfall Gains on Socio-Economic Status

Rehaan Jahanghir
Sponsor: Gregory Clark, Ph.D.
Economics

In research and policy regarding social mobility and status, windfall gains have been suggested as an important component to increasing social mobility. Windfall gains are essentially a large, exogenous increase in an individual or family's income. Historically, these have usually happened in from the discovery of natural resource discoveries. The rationale is that because levels of Socio-Economic-Status in one generation are highly correlated to the Socio-Economic-Status of the previous generation, massively increasing Socio-Economic-Status in one generation will lead to the next having a similar, higher level of Socio-Economic-Status. To test this idea, I will be using the distribution of casinos on Native American lands as a sort of natural experiment. During the 20th century, some Native American reservations received large windfall gains in the form of the legalization of the gaming industry on tribal lands. Only about half of the federally recognized Native American tribes established gaming facilities, and the distribution of whether or not a reservation has received casino dividends was a relatively random process. This study would examine the transmission of large windfall gains between generations, with the main question being whether or not the transmission of these windfall gains are a first-order Markov process.

Effect of Age on Female Titi Monkey (*Callicebus cupreus*) Reproductive and Parenting Behavior

Shreya Jaiswal
Sponsor: Karen Bales, Ph.D.
Psychology

Monogamy in humans is not yet well understood, but in order to further investigate the behavioral components of monogamy, I will be working with the lab of Dr. Karen Bales to study the monogamous titi monkey (*Callicebus cupreus*). In this species, males rather than females are the primary caretakers of the infants, while mothers are very infrequently. This is why I am interested in how females participate in reproductive behaviors and infant rearing, and how it changes throughout the lifespan. Currently, I am investigating how female titi monkey reproductive (number of infants) and parenting behavior (nursing bouts) changes at different ages. Additionally, I will be looking to see if experience (previous infants, or previous partners) affects these behaviors at different ages. I hypothesize that titi monkeys will be similar to humans, who have the highest reproductive behaviors at the middle of their lives, and less at old or young ages.

The Effects of Intranasal Oxytocin Administration on Anxiety and Locomotor Activity Across Development in Prairie Voles

Neeharika Jaladanki
Sponsor: Adele M. Seelke, Ph.D.
Psychology

Dysregulation of the oxytocin system has been implicated in the expression of autism spectrum disorders (ASD). As such, researchers have used exogenous administration of the neuropeptide in clinical trials as a potential therapeutic for ASD. The treatment is believed to improve impaired cognition and social recognition, major characteristics of ASD. However, the effects of intranasal oxytocin (IOT) administration on different developmental stages have not been studied. This study examines such effects on the social behavior of prairie voles, which are a socially monogamous model species. Oxytocin was administered to the test subjects for different amounts of time—group 1 was exposed to the neuropeptide daily from postnatal day (P) 21 to 42 (prior to sexual maturity), group 2 was exposed from daily from P42-63 (after sexual maturity), and group 3 was exposed from P21-63. Subjects' anxiety levels, willingness to explore and locomotor activity were tested twice using an open field test, once on P42, and once on P63. We expect that oxytocin will have anxiolytic effects on behaviors during these tests. Moreover, we also expect to see variable effects between the groups based on the length of IOT administration and the developmental period in which administration occurred.

Imaging of Key Molecules in Cardiomyocyte Mechano-Chemo-Transduction Pathway

Mark Jaradeh
Sponsor: Ye Chen-Izu, Ph.D.
Pharmacology
School of Medicine

The heart pumps blood into circulation to supply oxygen and fuel the body. The heart also senses and responds to mechanical load by enhancing muscle contraction to maintain adequate cardiac output. Our previous studies revealed that mechanical loading on cardiac myocytes can alter Ca^{2+} dynamics. In this project, we study the molecular complexes in the cardiac myocyte that carry out mechano-chemo-transduction. The protein molecules were labeled with fluorescence-tagged antibodies. Confocal microscopy and super-resolution microscopy were then used to image these molecules to determine their spatial organization. We studied three groups of proteins in the mechano-chemo-transduction complexes: (1)Mechanosensors: dystrophin and syntrophin, which are key molecules in the dystrophin glycoprotein complex (DGC); (2)Chemotransducers: nitric oxide (NO) synthases (nNOS, eNOS), which transduce mechanical load to NO signal; and (3)Ca^{2+} handling proteins: RyR, DHPR, SERCA, CaMKII, which are modulated by NO and control Ca^{2+} dynamics. We will report our findings on the co-localization of the mechanosensors with the chemotransducers as well as the inter-molecular distances from NOS to Ca^{2+} handling proteins. The spatial organization data of the above molecules elucidate the structural bases of mechano-chemo-transduction. Such structural studies, combined with functional studies, will help our understanding of how mechanical stress can cause heart diseases.

Biochemical Regulation of Cin8 by the Aurora B Kinase

Claire H. Jaramishian
Sponsor: Kenneth B. Kaplan, Ph.D.
Molecular & Cellular Biology

The resolution of duplicated sister chromatids in anaphase is a key event in ensuring chromosome integrity during cell division. Defective resolution of sister chromatids (e.g. Bloom's Syndrome) causes genome instability and cancer. A pathway related to this process involves the chromosome passenger complex (CPC), which is composed of proteins that regulate and target the Aurora B kinase to substrates like the kinesin 5 microtubule motor protein, the bipolar motor Cin8. The loss of CPC function changes Cin8 distribution on the anaphase spindle, causing it to act as a molecular brake to slow anaphase spindle elongation. In contrast, reports of Cin8 phosphorylation during the cell cycle and in the presence of tangled sister chromatids argues that other levels of regulation control kinesin motor function during anaphase. To explore the biochemical changes in Cin8 under these conditions, I measured the relative size of Cin8 complexes via glycerol gradient sedimentation. My findings suggest that Cin8 phosphorylation controls interactions between Cin8 and cellular proteins that negatively regulate its ability to interact with microtubules. I am currently exploring how Aurora B kinase affects the formation of Cin8 complexes in cells. I am also using genetic approaches to identify regulatory proteins that interact with Cin8.

Investigating Cell Plate Formation Using the Cytokinesis Inhibitor Endosidin 7

Nathan Jayne
Sponsor: Georgia Drakakaki, Ph.D.
Plant Sciences

As the world's demand for biofuels and high-yield food/feed crops increases, understanding how the cell wall is made becomes increasingly important. Currently, we know Golgi-derived vesicles carrying polysaccharides, proteins and membranes gradually coalesce into a cell plate in a dividing cell. However, without a molecular basis for understanding cell plate formation, we cannot realize the full potential of cell wall biology. Additionally, studying the genetic basis for cell plate formation is difficult given the tendency for lethality and redundancy in classical mutation approaches. Endosidin 7 (ES7) is a small molecule that disrupts cell plate maturation in a concentration dependent manner. Three ES7 resistant mutants were identified through a forward genetics screen based on root length. To corroborate the root growth phenotype, these mutants were analyzed at the subcellular level using confocal microscopy after treatment with ES7. A range of phenotypes were observed: severely affected to largely tolerant and did not follow classical Mendelian segregation ratios. The distribution of these phenotypes suggests that the causal mutation(s) conferring ES7 tolerance may be more complex than previously thought. Outcrossing and backcrossing these mutants to sensitive wildtype accessions and observing their segregation patterns will shed light on the genetics behind these mutants.

The Effect of Parental Scaffolding on Infant Behavior During Independent Play

Alexandra N. Jennings
Sponsor: Lisa M. Oakes, Ph.D.
Psychology

As they play with their infants, parents demonstrate advanced play behaviors that expose infants to information beyond what they could learn on their own—a concept known as scaffolding. This experiment examines the effect of parental scaffolding on infants' play behaviors. Six-month old infants first played with a parent, or they played alone with a parent nearby, but not interacting with the infant. In this project, we are analyzing infants' play in a subsequent session, in which all infants played alone with a parent nearby. We ask whether infants' play behaviors differ as a function of whether or not they played alone or with parental scaffolding during the first session. We are analyzing specific infant behaviors, such as grasping or mouthing of the toys, and comparing the frequency of those behaviors between infants who first played with their parent versus infants who first played alone. This will provide deeper understanding into the effects of parental scaffolding during play, which is important in not only better understanding how infants learn, but also in teaching parents how to best assist their infants' acquisition of knowledge.

Mechanisms of Ozone-Induced Airway Epithelial Cell IL-33 Expression

Catherine E. Jereb
Sponsor: Angela Haczku, M.D.,Ph.D.
Internal Medicine
School of Medicine

Ozone (O_3) is a toxic air pollutant that causes lung epithelial cell damage and activates the innate immune system. A major effect of O_3 inhalation is release of interleukin-33 (IL-33) from airway epithelial cells. IL-33 is thought to function as a danger signal, activating the innate immune system after exposure to an insult. We previously found in mice and human epithelial cells that IL-33 is released in the airways after O_3 exposure. However, little is known about the mechanism of O_3-induced IL-33 release and if O_3 promotes transcription of the IL-33 gene and translation of IL-33 mRNA. To model the effects of *in vivo* O_3 inhalation *in vitro*, we exposed human airway epithelial cell lines (A549 and HBE1) to tert-butyl hydroperoxide (TBHP). TBHP is a stable form of hydrogen peroxide that simulates O_3 exposure. We optimized a dose of TBHP that did not cause significant cell death in our system. Our *in vitro* model demonstrated 0.05 mM TBHP induced a time-dependent increase in IL-33 mRNA indicating de novo gene activation. Our data will help address the mechanisms of how O_3 inhalation affects airway epithelial cells and will elucidate novel therapeutic targets to treat air pollutant induced respiratory diseases.

Utilizing Nematode Taxa Distributions to Assess Changes in Soil Communities in Response to Fumigation in Pistachio Orchards

Gavin C. John
Sponsor: Amanda Hodson, Ph.D.
Entomology & Nematology

In light of research that links plant productivity and soil ecology, efforts have been made to more accurately quantify the integrity of the soil food web. A difficulty associated with assessing the diversity of soil ecosystems is the inability to identify most soil organisms on a molecular basis or under laboratory conditions. As a result, developing a reliable method of inferring the structure of the soil community based on indirect measurements, such as the presence and abundance of component organisms, offers a valuable method for inferring the structure of the soil community. This study aims to elucidate the ways in which soil communities change in response to major disturbance by utilizing nematode taxa distributions to make inferences about the soil food web. For this experiment, nematode communities will be compared in pistachio orchards that have undergone fumigation to control groups that have not been exposed to fumigants. Preliminary results suggest greater community structure in non-fumigated plots, and fungal feeding nematodes are more adversely affected by fumigation than bacterial feeding nematodes, which reflects a change in the decomposition channels of the soil food web in response to fumigation.

Evaluation of Nitrogen Excretion Equations From Dairy Cattle

Alexa C. Johnson
Sponsor: Ermias Kebreab, Ph.D.
Animal Science

Nitrogen (N) excretion in dairy manure is a pre-cursor for nitrous oxide (N_2O) formation once the manure is applied to land. Nitrous oxide is a major contributor to greenhouse gas emissions and reducing N output from dairy production facilities can reduce the amount of anthropogenic N_2O entering the atmosphere. The objective of the study was to conduct a comprehensive evaluation of extant prediction models for N excretion in feces and urine using extensive literature data. A total of 45 N excretion equations were evaluated for lactating cows, heifers and non lactating cows and steers. These equations were evaluated with published data collected over 20 years from 1995-2015. Two evaluation methods were used: the root mean square prediction error (RMSPE) and the concordance correlation coefficient (CCC). Equations developed using a more rigorous development process fared better than older extant equations. Urinary nitrogen equations had higher prediction errors than other forms of excretion, which could be due to high variability in urinary N excretion and challenges in the collection process. Fecal N equations had low error bias and reached an acceptable level of precision and accuracy.

Synthesis of Silica Supported α-Fe_2O_3 for Exploration of Photocatalytic Behavior and Production of Oxygen Gas

Anna Johnston
Sponsor: Frank Osterloh, Ph.D.
Chemistry

The world is faced with an energy crisis and steady degradation of climate. The link between these issues is global dependency on fossil fuels. Thus, population growth is inextricably bound to clean energy. That is why research of photoelectrochemical cells (PECs) is being explored. PECs are solar cells with the ability to produce hydrogen fuel from the electrolysis of water. Here, we investigate iron (III) oxide (Fe_2O_3) and its properties as a photoanode. Fe_2O_3 is a promising material due to its low cost, abundance, and non-toxicity. Alpha Iron (III) Oxide (α-Fe_2O_3) in particular exhibits the best photostability compared to its allotropes and has been shown to produce oxygen gas without the aid of dopants. However this material exhibits poor photocatalytic behavior due to its short charge carrier lifetime, short hole diffusion length, and shallow light penetration depth. The aggregation of α-Fe_2O_3 nanoparticles also aids in the decline of the photocatalytic activity of this material over time due to decrease in surface area. Here, work to develop a synthesis for silica supported α-Fe_2O_3 is presented as a way to prevent particle aggregation over time and to explore the changes in photocatalytic behavior.

Applying Vocal Fingerprint Censusing to Non-Habituated Gibbons (*Hylobates funereus*) as a Conservation Tool in Sabah, Malaysia

Allison Jones
Sponsor: Margaret Crofoot, Ph.D.
Anthropology

Effective monitoring of individuals is a challenge in many environments, especially when habituation is problematic due to difficult terrain or high hunting risk. There is a great need for methods to track and monitor individuals that don't require habituation. One potential technique to overcome these limitations uses the individuality and temporal stability of animals' vocalizations to identify individuals based on their calls. We investigate the ability of this method, known as vocal fingerprinting, to monitor East Bornean gray gibbons (*Hylobates funereus*). Recordings of individual vocalizations were taken in Sabah, Malaysia at the Stability of Altered Forest Ecosystems (SAFE) field-site. The SAFE project is the ideal study site, as it presents varying forest types and levels of logging in which to census and monitor gibbons over time. Preliminary analyses of fourteen male gibbons from the SAFE project indicate that there is indeed vocal stability and individuality in male gibbons' vocalizations. Vocal fingerprinting is a method that can be used by local park managers and researchers to identify specific gibbon groups as the forest changes. This method will allow effective monitoring of male gibbons in the SAFE site, and will be further developed for use with other species in Southeast Asia.

Litigation vs. Collaboration Using a Game Theory Model to Analyze Proposed Mining Operations in Minnesota

Jessica M. Jones
Sponsor: Mark Lubell, Ph.D.
Environmental Science & Policy

Should the United States Forest Service (USFS) conduct a land swap with PolyMet Mining in Northeastern Minnesota to avoid litigation? This research project will examine the proposed copper nickel mining operations in the Superior National Forest, by evaluating the role of the United States Forest Service and the Bureau of Land Management in relation the NorthMet Project in Northeastern Minnesota's Duluth Complex. Currently, the USFS and PolyMet are at a standstill due to the unique hard-rock mineral lease ownership found in the Superior National Forest. By utilizing a game theory model based on Elinor Ostrom's work, *Governing the Commons*, this research project will explore potential scenarios played out between the USFS and PolyMet Mining. Through interviews with key stakeholders, as well as research on pertinent local, state and national mining laws and regulations, this research project will provide recommendations on how to achieve a model of sustainable collaboration and preserve natural resources.

Synergy Between Topoisomerases and the Mitotic Spindle - How to Untangle the Genome

Najah A. Joseph
Sponsor: Kenneth B. Kaplan, Ph.D.
Molecular & Cellular Biology

The successful maintenance of chromosomes requires their accurate duplication and segregation. During replication, physical linkages form between sister chromatids that are not fully resolved until anaphase. Conditions that exacerbate these linkages, or tangled sister chromatids, result in slow to resolve sister chromatids in anaphase. Our lab has found that tangled sister chromatids activate an Aurora B signaling pathway that changes the activity of spindle-associated proteins (e.g. Bim1 and Cin8) and increases spindle forces acting on unresolved sisters in anaphase. I am interested in testing the idea that increases in spindle forces help to resolve tangled sister chromatids. To this end, I am analyzing the viability of mutants that are defective in resolving sister chromatids after they enter anaphase, and if double mutants that are also defective in generating spindle forces show increased lethality. I have found that the type II topoisomerase mutant, top2-4, loses viability in anaphase. Conversely, the type I topoisomerase mutant, top3-ts, shows no overall loss of viability. Double mutants that slow spindle elongation exhibit synergistic interactions and suggest topoisomerases and spindles work in parallel pathways. I will present a model that integrates my genetic data with our biochemical data on the Aurora B pathway.

Probiotic and Prebiotic Tolerability in Children With Autism Spectrum Disorders and Associated Gastrointestinal Complaints: A Pilot Study

Jennifer Kain
Sponsor: J. Bruce German, Ph.D.
Food Science & Technology

Background: Diarrhea and constipation are common in children with autism spectrum disorders (ASDs). Probiotics have been shown to relieve GI symptoms in children without ASDs. Many children with ASDs have limited diets. Therefore, this study assessed tolerability of a novel probiotic-prebiotic combination (synbiotic) supplement in children with ASDs and GI symptoms. Hypothesis: We hypothesize that both the prebiotic and synbiotic supplement will be well-tolerated in this cohort. Methods: We conducted a double-blind, crossover controlled trial in children ages 2-11 with ASD and frequent GI symptoms. Subjects were supplemented with either a prebiotic (BCP: bovine colostrum product) or a synbiotic (*Bifidobacterium infantis* + BCP). This 12-week study included 5 weeks of supplementation, followed by a 2-week washout period, then 5 weeks of supplementation. Tolerability was measured through GI symptoms, behavioral questionnaires, and adverse event reporting. Results: Preliminary results suggest that both supplements are well-tolerated in this cohort. Compliance was 94.4% and 2 of 11 subjects withdrew from the study due to time constraints. The most common side-effects were gassiness and lethargy. Conclusion: Preliminary data will give insight about mechanisms of GI dysfunction in children with ASDs and GI symptoms, including how gut microbiota responds to probiotics and prebiotics.

Mechanical Defibrillation of Wool Fibers Aided by Hydrochloric Pretreatment

Wesley Kan
Sponsor: You Lo-Hsieh, Ph.D.
Textiles & Clothing

Wool fibers are the most produced animal fibers characterized by complex structural levels of cuticle, cortical cell, macrofibril, microfibril, protofibrils, and α-helical keratin protein. Cysteine and leucine are two wool amino acids that provide stability and crystallinity. Keratin protein molecules in wool are highly intra- and inter-molecularly hydrogen bonded and inter-molecularly disulfide bonded that cause wool fibers to be tough to break apart through mechanical defibrillation. Breaking these bonds would allow wool fibers to be defibrillated by mechanical forces. The project is to explore how hydrochloric pretreatment of wool fibers followed by mechanical blending can defibrillate wool into smaller fibrils and/or particles. Hydrochloric acid was used to weaken hydrogen and disulfide bonds. Structures and properties of fibers were analyzed before and after treatment. An optical microscope was used to view products under magnification of 40x and 100x. The pretreatment effects on defibrillation of wool fibers by blending such as temperature, blending time, pH, and amount of hydrochloric acid used were investigated. This research investigates if wool fibers may be fragmented to be used in composite biofilms, removal and recovery of toxic chemical and metal ions, and as an ingredient in the cosmetics industry for tensile strength and skin elasticity.

Effect of Dietary (-)-Epicatechin Supplementation on ER Stress in an *In Vivo* Model of Obesity

Heeteak Kang
Sponsor: Patricia Oteiza, Ph.D.
Nutrition

One third of the world's population is affected by obesity. Obesity is associated with endoplasmic reticulum (ER) stress which can contribute to insulin resistance (IR). Epidemiological studies suggest that a consumption of fruits and vegetables can improve obesity and IR. This study investigated the capacity of a dietary supplementation with (-)-epicatechin (EC) to mitigate ER stress in a mouse model of obesity. Mice were fed: control (C) (10% total cal from fat), high fat (HF) (60% total cal from fat), and C or HF diets supplemented with EC (20 mg/Kg body). Indicators of ER stress (pPERK, PERK, pIRE1α IRE1α, ATF6, eIF2α) were assessed in adipose tissue by western blot. ATF6 expression were high in the HF group and EC supplementation had no effect. However, EC supplementation mitigated the activation (phosphorylation) of PERK, IRE triggered by the HF diet. In conclusion, consumption of EC-rich foods might have beneficial effects against obesity- induced ER stress and IR.

Effect of Dietary (-)-Epicatechin Supplementation on ER Stress in an *In Vivo* Model of Obesity

Jiye Kang
Sponsor: Patricia Oteiza, Ph.D.
Nutrition

Worldwide, about 2.8 million people die every year as result of being overweight or obese. Obesity is associated with the development of insulin resistance, inflammation, and endoplasmic reticulum (ER) stress. Experimental evidence support that polyphenols improve metabolic parameters involved in obesity and insulin resistance. In this study we investigated the capacity of dietary (-)-epicatechin (EC) to ameliorate ER stress in a high fat diet-induced obesity in mice. Mice were fed for 15w: control (C) (10% total cal from fat) or high fat (HF) (60% total cal from fat) diets with or without EC-supplementation (20mg/Kg/body weight). We evaluated the presence of ER stress in mouse adipose tissue by measuring components of the unfolded protein response (PERK, IRE1α, ATF6) with western blot. We observed that EC did not affect the high expression of ATF6 induced by the HF diet. However, EC decreased the activation (phosphorylation) of PERK and IREá. In summary, consumption of EC-rich foods might have a beneficial effect on obesity-induced ER stress and consequently on insulin resistance.

Preparation and Applications of Cellulose Nanocrystal Supported Photo-Active Anthraquinones

Laura Kao
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Anthraquinone compounds can generate reactive oxygen species under photo irradiation and can consequently provide photo-induced antibacterial properties that allow for numerous implications in fields ranging from biomedical to food and consumer industries. However, these anthraquinone compounds in isolation exhibit low antibacterial activity and suffer from poor mechanical performance. Here, we created anthraquinone-2-carboxylic acid modified cellulose nanocrystals (AQC-CNC), which are antibacterial nanomaterials that combine the advantageous properties of both its components. The photo-induced activities of anthraquinones coupled with the large surface area of cellulose nanocrystals create a green and environmentally friendly antibacterial material with enhanced performance. Furthermore, incorporating the anthraquinone modified cellulose nanocrystal compound into natural alginate hydrogels can generate novel biocompatible and antibacterial soft materials with promising durability. The successful development of these AQ-CNC hydrogels will have various applications in the design of merchandise for medical, industrial, and consumer use, such as wound dressings, food packaging, contact lenses, and facial masks.

The Effect of Race-Stereotypic Music on the Cognitive Mechanisms of Implicit Stereotyping

Avantika Kapoor
Sponsor: Andrew M. Rivers, Ph.D.
Psychology

Music is an integral aspect of our lives, and has been shown to causally influence stereotyping behavior. The present research investigated the implicit consequences of exposure to violent rap music. In the current design, one group of participants was exposed to popular rap music that included violent content while a control group was exposed to popular non-rap music that did not include violent content. Past research suggests that listening to violent rap music can increase racial stereotyping and downstream discrimination, but does not investigate what cognitive processes underpin these outcomes. To investigate process-level stereotyping effects, all participants completed an implicit measure of stereotyping, the Stereotype Misperception Task. Importantly, this task allows researchers to formally test whether it is the mere activation of stereotypes and/or the likelihood of applying these activated stereotypes that leads to racial discrimination. By identifying the processes underlying stereotyping following exposure to music highly associated with particular groups, we can understand when and where such exposure is likely to produce prejudice and discrimination of those groups.

Neonatal Bacterial Infection Leads to Behavioral Deficits in Adulthood

Manvir Kaur
Sponsor: Melanie Gareau, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Children have an increased susceptibility to infection with bacterial pathogens, and consequently exposed to antibiotics more often than adults. Previous studies from our group have shown that infection with a bacterial pathogen causes changes in the microbiota-gut-brain(MGB) axis, including intestinal dysbiosis and behavioral deficits. However, the relationship between intestinal dysbiosis during the early stages of development and cognitive and behavioral deficits in adulthood have not been investigated. We hypothesized that infection in early life with a bacterial pathogen could lead to MBG axis deficits in adulthood. A mouse model (C57BL/6) of neonatal bacterial infection with enteropathogenic *Escherichia coli* (EPEC) was used to study effects of intestinal dysbiosis on behavior. We used the light/dark box test to assess anxiety-like behavior and the novel object recognition (NOR) task to study cognitive function in adult mice infected with EPEC as neonates, and sham-infected controls. Data was analyzed using behavioral software (Noldus EthoVision XT). Adult mice neonatally infected with EPEC showed impaired memory, without evidence of anxiety-like behavior compared to sham-infected controls. Therefore, our data demonstrates that neonatal bacterial infection leads to cognitive deficits in adulthood

Structure and Function of Human Tumor Suppressor BRCA2 Protein

Rupleen Kaur
Sponsor: Wolf-Dietrich Heyer, Ph.D.
Microbiology & Molecular Genetics

Female carriers of *BRCA2* germline mutations have highly elevated risk to develop breast, ovarian, and other cancers. The tumor suppressor BRCA2 protein is a key component to maintain genome stability and to prevent carcinogenesis. BRCA2 plays a critical role in Homologous Recombination, a high-fidelity DNA repair pathway. RAD51 filament formation, a key step to initiate this pathway, is inhibited by the presence of RPA protein on single stranded DNA. BRCA2 acts as a mediator protein by allowing RAD51 to overcome the inhibitory effect of RPA and to bind to the DNA. However, the biochemical mechanism of this facilitating action is not fully understood, since most of the available research has not been performed in the context of full-length human BRCA2 protein. The mechanistic studies on human BRCA2 have been impeded by technical difficulties in purifying this protein in large quantities due to its large size. We have successfully expressed full-length human BRCA2 protein in mammalian cells. We will use affinity chromatography to select and isolate the full-length BRCA2 protein. Purification of this full-length protein in sufficient quantities will set the stage for further studies aiming at the native structures and biochemical functions of this essential protein.

Investigating the Relationship Between Cell Size and Asymmetric Cell Division

Sabreena Kaur
Sponsor: Lesilee S. Rose, Ph.D.
Molecular & Cellular Biology

Asymmetric cell division is required for normal development and is the process in which the two daughters of a dividing cell adopt different fates. This requires the unequal distribution of cellular contents and a subsequent coordination of this asymmetry with the orientation of cell division. Embryos from the round worm *C. elegans* are a well-studied model for asymmetric cell divisions and undergo a series of asymmetric divisions during development. Our lab previously found that mutations in the gene *ooc-5* alter cell division orientation specifically at the 2-cell stage. However, *ooc-5* mutants are pleiotropic and also have altered nuclear import and produce smaller embryos. We aim to test whether it is small embryo size that causes incorrectly oriented cell during division by manipulating embryo size and observing cell divisions. Others have shown that depletion of ANI-2 protein by RNA interference (RNAi) causes smaller than normal embryos, a result that I confirmed. I have also found that RNAi of the predicated gene C27D9.1 in *ooc-5* mutants causes an increase in embryo size. I will next examine cell division orientation following these different RNAi treatments.

Modeling of the Small-Conductance Calcium-Activated Potassium Channel and Cardiac Alternans

Matthew Kennedy
Sponsor: Daisuke Sato, Ph.D.
Pharmacology
School of Medicine

The small-conductance calcium (Ca)-activated potassium (SK) channel has been found in cardiac myocytes. However, the role of the SK channel in the development of arrhythmias is not well understood. In this study we develop a novel computational model of the SK channel and integrate it with a physiologically detailed ionic model of a ventricular myocyte. Our model shows that the SK channel current (ISK) shortens the action potential duration (APD) at fast and slow pacing cycle lengths (PCLs), but not at intermediate PCLs. These results are consistent with experimental observations by Hsieh et al. Using this model, we investigated the dynamics of voltage and calcium alternans. Since the SK channel in the ventricular myocytes was found in failing hearts, we varied the maximum conductance of ISK to mimic healthy and failing hearts. Typical healthy myocytes show electromechanically concordant alternans during fast pacing. We found that as the maximum conductance of ISK was increased, electromechanically concordant alternans became electromechanically discordant when alternans are Ca-driven. These findings shed light on the underlying mechanisms of cardiac alternans, especially for failing hearts.

One Thousand and One Nights of The New York Times: In the 1920s the NYT Rationalized Iraq With Allusion to the Arabian Nights

Erik Kennedy-McDonnell
Sponsor: Suad Joseph, Ph.D.
Anthropology

The 1920s New York Times portrayal of Iraq manages to unify two understandings of the county: one from fictions, the other from real experience. They are manifestations of the NYT's Orientalism that the Iraq of fantasy and the Iraq actually met with and reported on by the newspaper, together form one coherent, not cognitively dissonant conception of the country, and that they do so while the newspaper is indeed self- conscious of the disjunction of the two visions. Studies in Orientalism have thoroughly expounded on the subject. I try to apply the analysis in order to demonstrate Orientalism in operation and how it is possible to reconcile a fictive conception of a thing with its actual experience and perception. I take as an example the 1920s NYT portrayal of Iraq. During this period much of the imagining of modern-day Iraq, Mandate Iraq, is as the Mesopotamia from the orientalist lore around the Arabian Nights and I confine the fiction in question to this patently fictive Iraq. It is remarkable to what extent the NYT portrayal appears not just authentic but valid because of this fiction.

Differences in Lung Toxicity After 4-MEI Exposure

Chayoung Keum
Sponsor: Laura Van Winkle, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

4-Methylimidazole (4-MEI) is a possible carcinogen to humans and is both formed as a by-product of manufacturing and used as a caramel coloring in food. This compound is found in colas, beers, soy sauce, bread and coffee. Some previous subchronic feeding studies in mice found lung adenocarcinomas in female mice. However, there is no available information on-site and cell specific lung damage following 4-MEI exposure. Male and female B6C3F1 mice were administered an acute dose (150mg/kg) of 4-MEI by gavage to study the timecourse and location of acute injury responses using high resolution tissue preparation and imaging. Lung tissue was collected 6hrs, 24hrs and 5 days after exposure. Tissues were fixed and embedded for high resolution light microscopy. Sections of lung tissue were stained with methyl blue and airway epithelial damage was scored semi-quantitatively by airway location. There was evidence of mild epithelial cytotoxicity in the different lung regions. Female had greater damage to lung cells than males and this damage occurred earlier. We conclude that the female mouse lung is more susceptible to damage from 4-MEI exposure than the male. Further studies will examine the effects of a higher dose of 4-MEI to determine a dose response.

Neurobiological Mechanisms Underlying Facial Emotion Processing in Adolescents

Elizabeth I. Kim
Sponsor: Amanda E. Guyer, Ph.D.
Human Ecology

Adolescent females demonstrate more emotional sensitivity than males (McClure, 2000). We tested whether this sex difference emerged in neurobiological mechanisms involved in facial emotion processing: respiratory sinus arrhythmia (RSA) (Porges, 2008), skin conductance levels (SCL) (Frazier, 2003), and amygdala activation. Adolescents judged sad, angry, happy, and neutral faces on the width of each face's nose and how sad each face made them feel. The task was completed while simultaneously collecting functional neuroimaging scans, RSA, and SCL. RSA indexes emotional arousal (lower values indicate greater arousal) regulated by the parasympathetic nervous system whereas SCL indexes emotional arousal regulated by the sympathetic nervous system (higher values indicate greater arousal). Neuroimaging scans were used to assess blood flow to the amygdala, a brain region involved in facial emotion processing (Gur, 2002). Regression analyses showed no significant relationships between task-based mean values of RSA, SCL, and amygdala activity. However, t-test analysis revealed group differences: higher SCL in males than females when responding to either question but higher RSA in females when providing objective judgments. These results indicate differences in physiological processing of emotional stimuli between males and females. Adolescent females may not be more emotionally sensitive than males in all neurobiological domains.

MTOR Signaling Contributes to PCB 95-Induced Dendritic Arborization

Ji Won Kim
Sponsor: Pamela Lein, Ph.D.
Molecular Biosciences
School of Veterinary Medicine

Despite the ban on the commercial production of polychlorinated biphenyls (PCBs) in 1979, these chemicals still persist in the environment and pose potential risks to human health. Specifically, PCBs are human developmental neurotoxicants. Previous studies support that PCB 95, a non-dioxin-like (NDL) congener, promotes dendritic growth in hippocampal neurons. Dendritic abnormalities have been associated with adverse neurodevelopmental outcomes such as schizophrenia and autism. One area of interest is the molecular signaling pathways that mediate PCB-induced dendritic outgrowth. NDL-PCBs activate the ryanodine receptor, driving calcium-mediated dendritic outgrowth. However, I hypothesize that mammalian target of rapamycin (mTOR) activity may also modulate PCB 95-induced dendritic growth. This hypothesis is derived from previous observations that mTOR plays an important role in the regulation of activity-dependent dendritic formation and regulation of spine growth in hippocampal neurons. In order to test this hypothesis, dissociated rat hippocampal cultures were treated with PCB 95 and/or rapamycin, an inhibitor of the mTOR signaling complex, and their dendritic processes were quantified by Sholl analysis. The goal of this study is determine whether PCB 95 alters dendritic growth via mTOR-dependent mechanisms.

Alfred Hitchcock's Psycho and Postmodernism: Mapping the Monster and Its Body Through Postmodern Criticism

Stephanie I. Kim
Sponsor: Evan Watkins, Ph.D.
English

Within the genre of horror fiction and films, the figure of the monster acts as the primary source of fear and violence. The body of the monster often acts as a conduit through which society inputs its failings and consequently produces a seemingly senseless force of horror that lashes back at the society that created it. Then, does it not make sense for the genre-breaking figure of the monster to act as a physical map of its contextual society's failures? I argue that the body of the monster in horror films and texts display markers of socio-political wrongs within the society that produces it. In particular, I focus on Alfred Hitchcock's *Psycho* (1960) through the critical framework of postmodern critics like Frederic Jameson and Gilles Deleuze and Felix Guattari. By doing so, I attempt to explain how this specific film previews the fear associated with a negation of individual identity and a prioritization of surface over depth, allowing for monstrous deeds like extreme voyeurism and murder to occur. Norman, as the figure that shifts away from the obviously horrific appearances of Gothic monsters like Dracula, signals an emergence of a new horror that facelessly blends in with postmodern society.

Zeta Potential of Various Lipid Compositions

Doniko Kingi
Sponsor: Tonya Kuhl, Ph.D.
Chemical Engineering & Materials Science

Recent surface force apparatus (SFA) experiments of the interactive force profiles of supported bilayer lipid membranes composed of zwitterionic lipids, lipids that have positive and negative charge but are overall charge neutral, reveal electrostatic repulsion. These results indicate that supposedly neutral systems (i.e. phosphatidylcholine/PC lipids) are charged presumably due to the presence of lipid impurities. However, the underlying support in those measurements was negatively charged. Here, experiments are performed to measure zeta potentials for various vesicle solutions which differ in parameters such as the amount of charged lipids and concentration of hydrating salt solution. Results have shown that increasing DMPG (a charged lipid) concentration from 0-100 mol% in DMPC yields zeta potentials that range from -7.1±4.5 mV to -68.4±7.32 mV in a logarithmic fashion, with the charge saturating at approximately 20 mol% DMPG. Experiments to test the dependence of concentration of hydrating salt solution on zeta potential are in progress.

JNK Kinase Inhibition as a Way to Prevent the Transmission of the Malarial Parasite in the *Anopheles* Vector

John M. Klyver
Sponsor: Shirley Luckhart, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Malaria is caused by infection with the single-cell protozoan parasite *Plasmodium falciparum* that is transmitted to humans by the bite of *Anopheles* mosquitoes. Malaria is extraordinarily widespread, with over forty percent of the world at risk of infection, and over three hundred thousand deaths annually. Currently, there is no vaccine for the disease, and both the parasite and mosquito vector are becoming increasingly drug- and insecticide-resistant. As traditional methods used in fighting malaria have failed, we need new strategies to prevent transmission. One recent technique that has shown promise is inhibition of the mosquito JNK stress-response pathway. Recent studies in our lab have suggested that the inhibition of JNK can simultaneously increase mosquito fitness and increase resistance to the *Plasmodium* parasite. My project is focused on comparing the level of mosquito fitness between two groups undergoing treatments with different JNK inhibitors and a control group. By studying the effects of JNK inhibitors on mosquito fitness, we can prove the link between JNK inhibition and mosquito fitness, which would suggest JNK inhibition could be a novel way to fight malaria in the future.

Detection of Radiation-Induced Brain Necrosis in Live Rats Using Label-Free Fluorescence Lifetime

Melanie Klich
Sponsor: Laura Marcu, Ph.D.
Biomedical Engineering

In the neurosurgical setting, differentiating recurrent brain tumor from radiation induced necrosis has posed many challenges. This is rooted in the fact that MRIs are not able to reliably differentiate between the two tissues making surgical delineation increasingly difficult. Previous studies have shown that time-resolved fluorescence spectroscopy (TRFS), which does not require injection of contrast agents, can distinguish between brain tumors and healthy tissue. TRFS measures the fluorescence lifetime of the tissue, which provides information about the metabolic and redox state of the tissue. To determine if fluorescence lifetime can detect radiation induced necrosis in tissue, a study was performed on rats that received a single radiotherapy treatment. The different tissue types were evaluated using a fiber optic needle to acquire fluorescence data during a live surgery on the animals at time-points before and after pathological necrosis formation. Measurements show significantly higher lifetimes in the necrotic tissue (~3.6ns) and slightly elevated lifetimes in the pre-necrotic tissue (~3.2ns) relative to healthy tissue (~3.0ns). Results thus indicate that fluorescence lifetime is a promising method to delineate radiation induced necrosis from healthy tissue and have provided important preliminary guidance for an upcoming clinical trial for further study of this method in patients.

Determination of Metastable Conformations of HIV-1 Env Thorough Single Particle Reconstruction and a Statistical Population Isolation Approach

Ryan B. Ko
Sponsor: R. Holland Cheng, Ph.D.
Molecular & Cellular Biology

The envelope protein (Env) is a main target for neutralizing antibodies against human immunodeficiency virus (HIV-1). Env consists of 3 units of gp120 and gp41, assembled in a trimeric array. Transmission electron microscopy (TEM) and Single Particle Reconstruction methods were used to generate preliminary 3D density maps of Env in its native state. Based on reference-free class averages (RFCA), a gradient of open and closed conformations was observed; suggesting the existence of particle heterogeneity and metastability of native Env conformations. A statistical analysis approach was utilized to segregate populations of open and closed conformations from the heterogeneous mixture. Sub-populations were then grouped together by orientation and based on calculated Quality Factor Scores (QFS), which are dictated by the cross-correlation of individual imaged particles and their relative 2D re-projections. The subpopulations were then utilized to generate high resolution 3D representations of Env in its open and closed conformations, which are critical for subsequent studies of neutralizing epitope exposure or occlusion. Our statistical analysis approach is also critical for reconstructing high-resolution 3D structures of Env, and can be used as a tool to measure the degree of heterogeneity within a dataset.

Effects of the Terragen Microbial Formulation on the Infection and Growth of *Fusarium oxysporum* f. sp. *fragariae* on Strawberry

Samuel I. Koehler
Sponsor: Thomas R. Gordon, Ph.D.
Plant Pathology

Fusarium oxysporum f. sp. *fragariae* is a fungal pathogen of strawberry causing crop loss in the main strawberry producing regions of California. Alternative control measures must be identified for the fungi, as the chemical treatments once used to manage this disease will soon be unavailable. The purpose of my research is to determine if a new microbial formulation manufactured by Terragen may inhibit the infection and growth of *Fusarium oxysporum* f. sp. *fragariae* on strawberry plants. To measure this, I will be analyzing the frequency with which infection of root tips of strawberry plants occurs in the presence and absence of the Terragen Mix. Additionally, I will determine effects on fungal pathogenicity by growing strawberries with and without the Terragen Mix and comparing their relative health after 6 weeks of growth. Results from these experiments will help to determine if this novel biological control product can effectively reduce disease in our pathosystem.

Boldness and Visuospatial Memory in *G. integer*

Arian Kolahi Sohrabi
Sponsor: Ann Hedrick, Ph.D.
Neurobiology, Physiology & Behavior

In a previous study, it was shown that female adult *G. bimaculatus* crickets are capable of using visual cues to improve their performance in locating a visually hidden target. In a different study involving male and female adult *G. integer* crickets, emergence latency duration, the time lapsed before emergence from a safe refuge, was established as a quantitative measure of boldness towards predators. In this study, the link between boldness and visuospatial memory of adult male and female *G. integer* crickets will be explored. I will assess the cricket's relocation capability using the Tennessee Williams paradigm, a circular arena located above and in contact with a water tank. The water is heated to an aversive temperature, and with the exception of a small, circular surface of the arena with its own insulated cool water circulation, the rest of the arena is heated to the aversive temperature. The success of the crickets will be determined by how fast, in each successive trial, they locate the cool spot. I hypothesize that in *G. integer* crickets, boldness and visuospatial memory are positively correlated. The results of this study can shed light on the relationships between memory and personality traits in insects.

Microbial Diversity in the Built Environment: Growth Following Terminal Cleaning of an Ambulatory Surgery Center

Tynisha Koenigsaecker
Sponsor: Jonathan Eisen, Ph.D.
Evolution & Ecology

In the heavily regulated ambulatory surgery center (ASC) environment there is a wide variety of environmental cleaning agents to choose from. While their composition may vary, efficacy claims are virtually the same; they kill highly pathogenic organisms in a short period of time. This project looks at the diversity of organisms left behind on surgery center surfaces following terminal environmental cleaning with an agent that has a 1-minute kill claim list of 26 pathogenic organisms including well-known antibiotic resistant species, such as methicillin-resistant *Staphylococcus aureus* (MRSA), and vancomycin-resistant *Enterococcus faecalis* (VRE). Samples were collected from various locations in an ASC and swabbed onto both lysogeny broth (LB) agar and Columbia Blood agar. Colonies were streaked for isolation and then used to make liquid overnight cultures. DNA was extracted from each liquid culture and the 16S rRNA sequence was amplified using polymerase chain reaction (PCR). This sequence was used to identify the isolates, and to choose isolates for further characterization, including genome sequencing.

An Efficient Antibiotic Inducible Gene Therapy System for Huntington's Disease Neurons

Anvita E. Komarla
Sponsor: David J. Segal, Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

Huntington's disease is an inherited neurodegenerative disorder caused by accumulation of misfolded mutant protein in the brain. Our current research suggests that transcription activator like effectors (TALEs) can reduce mutant protein by selectively targeting the mutant gene and silencing it, preventing neuronal death. The present study will focus on identifying and developing an efficient expression system for TALEs in HD patient-derived fibroblasts (skin cells). Our proposed aims will study the effectiveness of adding a Kozak sequence in enhancing TALE protein production by measuring luciferase activity. Furthermore, we are interested in an inducible TALE gene therapy system allowing for regulated TALE production. TALE will be cloned under a tetracycline response element and that will only allow expression of gene therapy following treatment with the antibiotic tetracycline. The fidelity of the inducible gene expression system will be assessed in a fluorescence-activated cell sorting experiment (FACS), where green fluorescent protein will be used as a marker for TALE production. These studies will provide important preliminary data for future delivery platforms for gene therapy.

One Day, One Minute, One Breath at a Time: Towards an Understanding of the Discourse of Recovery in an Online Pro-Anorexia Forum

Nimitha P. Kommoju
Sponsor: Vaidehi Ramanathan, Ph.D.
Linguistics

The purpose of my research is to examine narratives of resistance and recovery in pro-eating disordered online communities. Towards this end, I gathered a corpus of first-person narratives produced by members of a pro-anorexia forum. My project involved close discourse analysis of keywords that emerged systematically throughout the data. Keywords coincided with issues of recovery, physical condition and emotional states. The initial aim of my study was to understand how engaging with these communities has aided, rather than hindered, my own process of recovery. Online communities can provide a safe environment for identity management, emotional support and body acceptance (Smith, Wickes & Underwood 2013), all of which are critical to recovery (Williams 2009). The censorship and policing of pro-anorexia narratives only lead to more subversive methods of dissemination; allowing pro-anorexia communities to speak without fear of being silenced will allow them to co-construct a community discourse articulated around support, empathy, and connection (Williams & Riley 2013). This presentation will uncover how pro-eating disorder forums provide valuable support for those with eating disorders, and will end with a discussion of the importance of paying attention to language issues as they emerge in body and health discourse.

Fever – An Early Indicator of Bovine Respiratory Disease

Rinrada Komutrattananon
Sponsor: Cassandra Tucker, Ph.D.
Animal Science

Bovine Respiratory Disease (BRD) is a top cause of morbidity and mortality in beef cattle. Fever is part of the sickness response, a non-specific suite of defenses initiated in response to infection, and is also a potentially good variable to measure for BRD detection. We hypothesized that cattle with BRD would have a higher rectal temperature, indicative of fever, on the day of and 2 d before diagnosis, in comparison to Controls. Mixed-breed heifers (n=67), aged 7.5–12 m, were exposed to mild stressors, including transportation and restraint, and examined by a veterinarian for 12 d, for symptoms of BRD. Heifers scoring ≥5 points on a standardized clinical examination were determined to have BRD, while those never scoring above a 4 during the 12 d period served as Controls. An indwelling rectal temperature probe was used to monitor for fever every 5 min between 1:00-7:00am averaged for analysis. Three days of data were analyzed for each heifer d 0, -1, and -2 using a Student's T-test. BRD had significantly higher rectal temperature compared to Controls on d 0 and d -2($P < 0.05$). In conclusion, fever may serve as an early diagnostic indicator of BRD, even before clinical signs are apparent.

Exploring the Functions of Structural Maintenance of Chromosomes Complexes During Meiosis

Jennifer Koo
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Meiotic recombination creates a physical interaction between homologs during crossover, which ensures the proper segregation of chromosomes during meiosis I. Improper chromosome segregation during meiosis leads to aneuploidy, manifesting in genetic disorders in humans. Crossover formation requires enzymatic processing of various kinds of joint molecule intermediates, such as Holliday junctions. In eukaryotes, the essential structural maintenance of chromosomes (SMC) complexes, specifically known as condensin, cohesion, and the Smc5/6 complex, are key regulatory proteins in chromosome dynamics. In contrast to their widely studied somatic functions, the meiotic functions of SMC complexes are not clear. Our previous research shows that Smc5/6 is essential for formation and resolution of a subset of joint molecules during meiosis. Condensin was proposed to facilitate homolog segregation via cohesin removal from chromosome arms during meiosis by using some temperature sensitive (ts) alleles. However, meiosis itself is also temperature sensitive. Also, the function of cohesin in joint molecule resolution has not been investigated. To overcome the side effects of ts alleles, I will use the auxin-induced degron system and physical assays to study the functions of SMC complexes during meiosis.

Investigating Meiotic Modifications: Disrupting PCNA SUMOylation in Budding Yeast

Srujan Kopparapu
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Genetic diversity and reproduction is driven by meiosis and recombination. Meiosis is cellular division halving the genetic material for fusion with another cell during fertilization. During meiosis, reciprocal exchange of DNA between homologous chromosomes via homologous recombination is crucial for the appropriate segregation of homologs. These processes are vital to understand because defects in recombination are linked to birth defects, sterility, and cancers. Consequentially, meiotic recombination is tightly regulated by multiple mechanisms, including the post-transcriptional modification (PTM) of proteins. One of these PTMs, Small Ubiquitin-like Modifier (SUMO) is a protein that covalently binds lysines in target proteins, regulating their stability and function. Our lab has developed a method for identifying SUMOylation targets in meiotic budding yeast. One of the targets identified is the proliferating cell nuclear antigen (PCNA), the eukaryotic replication clamp. We identified two sites, K127 and K164, as targets of PCNA SUMOylation during meiosis. By mutating these lysines to arginines, we generated strains that cannot SUMOylate PCNA. To determine the effects of these mutations on meiotic recombination, we will assay the mutants' ability to produce viable spores as well as their proficiency at meiotic recombination. This will allow us to elucidate the role of PCNA SUMOylation in meiosis.

Why Do Men Buy T-Shirts? Discovering Consumer Needs Through the Jobs-to-Be-Done Theory

Lawrence Kotovets
Sponsor: Nicole Hollis, Ph.D.
Human Ecology

What do people want? Why do they want it? Effective marketing begins with understanding the market: who are the consumers, and what influences what they purchase? To understand what people want and why, it is critical to discover consumer needs (Christensen, 2005). However, there is no standard definition of what a consumer "need" is—what is its structure, content, and syntax (Ulwick, 2008)? The jobs-to-be-done theory states that consumer needs are the jobs consumers hire a product for, or the fundamental goals consumers are trying to accomplish (e.g. keep warm while biking). The current study uses the jobs-to-be-done theory to examine what consumer needs are, develop methods to discover needs, and apply the jobs-to-be-done theory to understand why men buy t-shirts. Individual interviews will be used to collect men's stories about the process of their most recent t-shirt purchase until no new patterns emerge. Themes are going to be gathered from participants' stories along with key principles (e.g. anxieties, habits, motivations, values) that define their purchase choices. This information will shape the development of market and product strategies (e.g. product innovation) that are aligned with the needs of the market.

Impact of a Viral Pathogen on a Biological Control Agent: Population and Community Surveys

Randall L. Kuffel
Sponsor: Jay A. Rosenheim, Ph.D.
Entomology & Nematology

Geocoris pallens is a beneficial insect present throughout the California Central Valley. A decade ago, local *Geocoris* levels plummeted, and in recent years, virally induced cannibalistic behavior has arisen in many of these decimated populations. This project surveys local insect communities throughout 2015 and transects California from Sisikyou County to Kern County. To quantify the makeup of insect communities and the prevalence of cannibalism in *Geocoris pallens*, sweep samples were recorded, and a laboratory assay for cannibalism was conducted on all female individuals. Paired with historical data collected from the 1990s and 2000s, this project is able to comprehend the role a fluctuating insect predator population has in cotton plant herbivore communities. Furthermore, research on the cannibalistic behavior will help us understand the pathogen's position in shaping insect communities throughout the years and help us determine the future of *Geocoris pallens* as a beneficial insect in both cotton and alfalfa plants throughout California.

Prediction of Mitochondria-Disease Causing SNPs in Fragile X-Associated Tremor/Ataxia Syndrome

Cassandra M. Kramer
Sponsor: Cecilia Giulivi, Ph.D.
Molecular Biosciences
School of Veterinary Medicine

Fragile X-associated tremor/ataxia syndrome (FXTAS) is a late-onset neurodegenerative disorder that affects individuals usually over the age of fifty, who are carriers of premutation expansions (55-200 CGG repeats) in the 5' untranslated region of the fragile X mental retardation 1 (*FMR1*) gene. FXTAS is characterized by intention tremor, which is trembling or shaking of a limb when trying to perform a voluntary movement and problems with coordination and balance (ataxia). There are also variable symptoms such as: parkinsonism, executive dysfunction, cognitive decline, neuropathy and autonomic dysfunction. FMR1 gene encodes for a product named fragile X mental retardation protein 1 (FMRP), which plays a role in brain synapsis plasticity and development. Given that genetic background may influence the morbidity or clinical presentation of the *FMR1* premutation or even the development of FXTAS, we will evaluate the role of single nucleotide polymorphisms (SNPs). To this end, we will be using bioinformatic approaches to mine the database of short genetic variation (dbSNP) to (a) identify "pathogenic" SNPs in the premutation, and (b) whether the SNPs or a combination can act as biomarkers of prognosis of the disease.

The Characterization of Placenta-Derived Mesenchymal Stem Cells (PMSCs) for Use in Prenatal Treatment of Hemophilia A

Andrea G. Kulinich
Sponsor: Aijun Wang, Ph.D.
Surgery
School of Medicine

Hemophilia A is a sex linked recessive disease that affects factor VIII synthesis, a necessary factor for blood clotting. The lack of factor VIII causes severe hemorrhage. There is no cure for this disease, but current treatment consists of injections of the clotting factor or plasma. Placenta derived mesenchymal stem cells (PMSCs) from first trimester of gestation could be a possible prenatal treatment to cure Hemophilia A. PMSCs are tripotent, which means they can be differentiated into three types of cells: chondrocytes, adipocytes and osteocytes. PMSCs are expected to over express Factor VIII after transduction with a viral vector containing the FVIII gene and a green fluorescent protein. Successful transduction is characterized by the expression of a green fluorescent protein. In this project, we isolated and differentiated PMSCs *in vitro*. Adipogenic, chondrogenic and osteogenic lineages were produced from PMSCs under specific differentiation conditions. Differentiated adipocytes were characterized by the production of oil droplets, osteocytes characterized by calcium deposition, and chondrocytes characterized by the production of proteoglycan. Transduced PMSCs will be characterized for the production of FVIII and transplanted in utero after this differentiation project is completed.

Identifying Barriers to Diabetes Management and Areas of Knowledge Deficit About Type 2 Diabetes Among the Homeless Population

Sonam Kumari
Sponsor: Jaesu Han, M.D.
Psychiatry & Behavioral Sciences
School of Medicine

Diabetes is a condition that afflicts roughly 9% of the population in the United States. While it is hard to track, researchers propose that the rate of diabetes among the homeless population is higher in relation to the general population. A variety of factors, including lifestyle habits and genetics, come into play in the development of this condition for both homeless and settled individuals. However, unique barriers and limits in knowledge on diabetes lead to a differing quality of management among the homeless. In order to explore these barriers and levels of knowledge deficit, we will be conducting a study that surveys approximately 40 homeless individuals with diabetes based in Sacramento, CA. Individuals participating in the study will be given a survey testing them on their general knowledge on diabetes and about various limits they face on a daily basis. The goal of this research is to gain a better understanding of how the individual's level of knowledge and different limits in access to physical and emotional support, may affect their management of diabetes. In large, we hope to use what we learn from this study to provide effective educational and support resources to homeless individuals living with diabetes.

Positive Parenting, Poverty, and Depression Severity in Adolescent Girls

Willa M. Kurland
Sponsor: Amanda E. Guyer, Ph.D.
Human Ecology

Research shows that depression in adolescents is associated with factors such as harsh parenting and low socioeconomic status (Conger et al., 1994). The present research examines whether experiences of positive parenting and poverty predict depression severity in 467 adolescent girls from the Pittsburgh Girls Study. Because females transitioning from adolescence to adulthood face high risk for depression (Rao et al., 1999), we focused on depression severity at age 17. A multiple regression analysis showed that positive parenting (M=15.97, SD=3.77) predicted depression severity (p=.00), such that girls who rated their parents as more positive had less depression severity. The model controlled for race (43% Caucasian, 51.4% African American, 1.4% Asian, 4.3% Multi-racial) and verbal IQ (M=98.14, SD=18.05). The addition of public assistance receipt (41.8% received public assistance) and the interaction of positive parenting and receipt of public assistance did not significantly explain additional variance (p=.07 and p=.79, respectively), although the model remained significant (R^2=.06, $F(5, 461)$=6.34, p=.00). These findings indicate that positive parenting may help protect at-risk girls from depression, suggesting possible targets for intervention.

Optimizing Agrobacterium-Mediated Transient Gene Expression in Sunflower

Nickey Kwa
Sponsor: Stacey L. Harmer, Ph.D.
Plant Biology

Transient gene expression is an effective tool to test gene function in species with difficult transformation protocols. Agrobacterium-mediated syringe-infiltration is a simple method that has been used to transiently introduce and express genes in several plant species. A new transient expression method, AGROBEST, was developed for Arabidopsis and involves co-cultivation of young seedlings with Agrobacterium bearing a construct of interest. The aim of this study is to optimize Agrobacterium-mediated transient expression in sunflower through either the syringe-infiltration method or the new AGROBEST method. A DR5::LUC construct was used as a reporter gene to assess infiltration success. Syringe-infiltration was found to be unsuitable for sunflowers because the leaf vein architecture restricted uniform infiltration in the leaf tissue and the Agrobacterium caused tissue death even at low concentrations (OD^{600} 0.01). Initial AGROBEST tests indicated that liquid germination was not optimal for sunflowers and the seedlings did not develop well. A low level of expression, which quickly dampened down, was observed at OD_{600} 0.1 of the Agrobacterium concentration and 0.005% of the detergent Silwet L-77. Due to developmental and size differences between sunflower and Arabidopsis, further optimization focused on growth stage and germination conditions may lead to more effective expression in the future.

Synthesis of Indanes via C-H Insertion

Ada J. Kwong
Sponsor: Jared T. Shaw, Ph.D.
Chemistry

Extensive research on polyphenols has shown that the antioxidant properties from red wine come from a polyphenol found in grapes known as resveratrol. Resveratrol and its derivatives have shown signs of being active cardioprotective agents as well. Previous work has been done using the methodology of C-H insertions to form benzodihydrofuran, a resveratrol core, to make E-δ-viniferin, a particular resveratrol dimer. While benzodihydrofurans have been successfully made and carried onto total natural synthesis, there are other similar core structures that have not been thoroughly explored. Indanes are another type of resveratrol core, and that is the class of molecules that we are choosing to target for this study. This indane scope methodology study will help us gather a better understanding of possible substituents that could be used for a future resveratrol derivative total synthesis. Future work will aim for the total synthesis of pallidol, a resveratrol derivative with an indane core.

Identifying the Influence of Geography and Environmental Salinity on Morphological Divergence in Killifish

Van La
Sponsor: Andrew Whitehead, Ph.D.
Environmental Toxicology

Killifish, *Fundulus heteroclitus*, occupy habitats ranging from freshwater to seawater and previous research suggests that populations show adaptation to their native environment. In other species of fish adaptation from marine to freshwater systems typically involves morphological change, however, in killifish it is not known if marine and freshwater populations differ in morphology. To determine how morphology has changed in freshwater populations, we focused on two hybrid zones, a coastal zone consisting of northern and southern populations and a Chesapeake zone consisting of freshwater and brackish water populations. The Northern population is more genetically related to the fresh water natives whereas the Southern population is more closely related to the brackish water natives. These genetically similar populations inhabit either similar or different osmotic niches, allowing us to identify whether morphological differences are due to changes in environmental salinity. We used geometric morphometrics to determine the differences and similarities in morphology between populations. Preliminary data suggests that morphology differs between populations, however it is not known if it is because of neutral genetic processes or adaptation. We also used admixed individuals from saltwater and freshwater populations to begin to understand genetic basis and help us determine the genetic architecture of morphology.

Comparison of Harmful *Microcystis* spp. Blooms in the Sacramento-San Joaquin Delta for Severe Drought Years 2014 and 2015

Chelsea H. Lam
Sponsor: Tomofumi Kurobe, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Cyanobacteria, also known as blue-green algae, are photosynthetic aquatic bacteria which raise major public health concerns due to deterioration of water quality through production of toxic and odorous chemicals. In the Sacramento-San Joaquin Delta, blooms of several cyanobacteria genera (*Microcystis*, *Aphanizomenon* and *Anabaena*, which include species of known toxin producers) have been observed. Although it is known that drought conditions promote blooms of *Microcystis* spp. and other cyanobacteria species, the combination of water-quality conditions, which lead to *Microcystis* dominant blooms and associated toxin production, is still not fully understood. To better understand interaction of water quality parameters and cyanobacteria blooms, we measured abundance of the cyanobacteria by qPCR and toxin concentration by protein phosphatase inhibition assay for the summers of 2014 and 2015. Although 2014 and 2015 were both drought years, our preliminary results show *Microcystis* spp. abundance was significantly lower in 2015 compared to 2014. Water-quality parameters (e.g. salinity and nutrient content) plus interspecies interaction with nitrogen-fixing species (*Aphanizomenon*) were measured for both years. Understanding interactions between these factors and the yearly abundance of *Microcystis* spp. will help future monitoring of cyanobacteria blooms in the Delta for public health and also for the ecological health of the Delta system.

Social Evaluation in Relation to Atypical Social Behavior in Fragile X Premutation Carriers

Cara Lammers
Sponsor: Susan Rivera, Ph.D.
Psychology

Evaluating the trustworthiness of faces is a key component of social evaluation that allows the classification of individuals as threatening or approachable. In individuals with atypical social behavior, such as that seen by individuals on the fragile X spectrum of involvement, the ability to rate faces on trustworthiness may be compromised. Carriers of the fragile X premutation are more likely to present with mood and anxiety disorders than the general population. In this fMRI study, participants viewed untrustworthy, neutral, and trustworthy faces. The current analysis focuses on group differences in the behavioral component of trustworthiness ratings and the relation of neuropsychological symptoms in male and female fragile X premutation carriers. Initial findings suggest that the groups did not systematically differ in how they explicitly rated the faces, and thus any atypical neural processing in the premutation carriers is not affecting observable behavior in this task. Further examination will determine if any relationships exist between age, gender, and social evaluation. This examination of differences in social evaluation and neuropsychological symptoms between premutation carriers and neurotypical participants will aid in the interpretation of brain imaging data from these individuals.

Comparison of GC-MS and GC-VUV for Metabolite Profiling of Short Chain Fatty Acids

Jules A. Larke
Sponsor: Oliver Fiehn, Ph.D.
Molecular & Cellular Biology

Metabolomics is the study of metabolism, where small molecules known as metabolites are identified and quantified providing a molecular fingerprint that may be used to assess the health of an individual. The choice of instrument for a metabolomics study depends on the chemical and physical properties of the metabolite being analyzed. Here, two methods were used to compare the analysis of a fecal sample containing short chain fatty acids (SCFAs): gas chromatography-mass spectrometry (GC-MS) and gas chromatography-vacuum ultraviolet spectroscopy (GC-VUV). Four of the identified SCFAs were selected and quantified: acetic, propionic, butyric and isovaleric acid followed by a comparison of results. The gut microbiome is an area of research that explores the commensal relationship between the host and microbiota that inhabit the gastrointestinal tract. SCFAs are produced via fermentation of dietary fibers by bacterial species within the gut. These mutualistic organisms play an integral role in modulating the metabolic processes in the host including beneficial effects of glucose and energy homeostasis. Through the identification and quantification of small molecules, and examination of the changes in the metabolic profile, a better understanding of metabolism with its underlying implications for disease states may be achieved.

The Use of 1-Dodecence to Synthesize Germanium-Carbon Bonded Nanoparticles

Daniel G. Larson
Sponsor: Susan M. Kauzlarich, Ph.D.
Chemistry

Germanium nanoparticles (nps) are of interest due to their applications in solar energy conversion, bioimaging, and optoelectronics. This work investigates the synthesis of Ge-C nps, rather than traditional Ge-N nps. The Ge-C bond is theoretically stronger than the Ge-N bond and thus would improve the nps resistance to oxidation. The Ge-C bond also has an emission in the near-infrared, while the Ge-N bond does not. Oleylamine was used as a reducing agent while 1-dodecene was the chosen alkyl compound, as it is a hydrophobic primary alkene. Reactions were conducted in a microwave reactor with 1-dodecene to Oleylamine ratios of 0 to 50 percent. The np surfaces were characterized by Fourier transform infrared spectroscopy and ^{1}H-NMR. After the initial reactions, a primary alkene with a functional group more easily identified by proton NMR was used in place of 1-dodecene. Ultraviolet-visible spectroscopy was used to determine the bandgaps of the resulting nps with both ligands, while TEM was used to determine the size of the nps.

Leftward and Rightward Biases in Time Duration Judgment Across Representational Spaces

Cong-huy N. Le
Sponsor: Eve Isham, Ph.D.
Psychology

One theory regarding temporal perception, called the Mental Horizontal Time Line, suggests that space may play a role in the way we process time, with stimuli appearing on the left side of our visual field being perceived as lower in magnitude and stimuli on the right side being perceived as higher, an effect coined the Rightward Bias. The underlying mechanisms of the Rightward Bias are not currently well understood and one of the primary questions regarding the effect is whether it is consistent across both central and peripheral vision. In two experiments, a prismatic adaptation, with goggles, and a visual eccentricity, with eye tracking, we observed the Rightward Bias in central vision only, between visual angles of 0° and 3°, not in the periphery, approximately 6° to 8° visual angle. However, we observed a novel Leftward Bias in the periphery. The existence of this effect suggests that central and peripheral vision contribute differently to our representation of time.

Online Dating Platforms: Effects of Extroversion on Self-Disclosure and Relational Goals

Matthew Laurie
Sponsor: Jorge Peña, Ph.D.
Communication

A plethora of research exists surrounding the modern online dating experience and subsequent offline relational behaviors. However, there is a lack of research examining Tinder, the popular smartphone dating app. Consider that Tinder creates 9 billion "matches" per day worldwide (Tinder 2016). The present study replicates prior research on online dating sites behavior and expands upon it by examining Tinder users by means of pre-tested survey questions. We investigate the relationship between self-disclosure, relational goals, and personality of Tinder users. The results are based on a sample of approximately 700 UC Davis students, and the findings are linked to computer-mediated communication theories in order to shed light on how people manage their romantic relationships by means of mobile apps. Our study findings may prove interesting to UC Davis students as 83% of Tinder users are under 34 years of age.

Exporting Services: A Policy Perspective on Economic Growth From the ICT-BPO Industry in India and the Philippines

Amiel Leano
Sponsor: Erik Engstrom, Ph.D.
Political Science

The ICT-BPO industry in India and the Philippines can be perceived as their own adaptation of export-led development where the same concept of comparative advantage, factor endowments, and specialization applies to services just as it did with manufactured goods. This paper identifies the policies, or lack thereof, that led to the creation of the ICT-BPO industry in India and the Philippines, focusing on three areas conducive to the development of the industry–telecommunications, higher education, and investments. It then examines which country's industry provides better economic growth prospects based on these policies. I found that India implemented policies that shifted its comparative advantage such that it emphasized higher value added activities and established an open economic environment integral to ICT-BPO, thus its industry provides better economic growth prospects relative to the Philippines. On the other hand, policies implemented by the Philippines oriented its comparative advantage towards voice services, activities in the lower end of the value chain.

Identifying Barriers to Diabetes Management and Areas of Knowledge Deficit About Type 2 Diabetes Among the Homeless Population

Allison Lee
Sponsor: Jaesu Han, M.D.
Psychiatry & Behavioral Sciences
School of Medicine

Diabetes has been an increasing epidemic over the past five years. Managing this condition may often be associated with many hurdles; however, with a lack of resources, diabetes management is more difficult to maintain. We found particular interest in homeless individuals who have been diagnosed with type 2 diabetes mellitus and how their knowledge of the condition may affect the quality of their diabetes management. Our goal is to find specific pieces of information that homeless individuals may be lacking in which could be decreasing the quality of self-care in diabetes management. Homeless diabetics lack resources including monetary and familial support, but the level of knowledge on how to manage their diabetes can have a strong correlation to the quality of their self-care. We plan on surveying approximately 40 type 2 diabetic homeless patients to observe their knowledge on managing diabetes and the barriers they face in doing so. In relation, we hope to apply this data to improve our care to diabetic patients. The study will be conducted at the Willow Clinic, a free student run clinic that caters to homeless individuals in Sacramento.

Episodic Memory for Emotion Words

Panhoia Lee
Sponsor: Beth A. Ober, Ph.D.
Human Ecology

Previous research has shown that there is a greater processing advantage for positive compared to negative emotion words in one's native versus non-native language (Kazanas & Altarriba, 2015). The purpose of this research is to investigate the correlation between bilingualism and emotionality. In our study, we are investigating whether a positivity advantage exists for episodic recall, and whether it is larger for native speakers of English than for non-native speakers who began learning English at the age of 12. Participants will be given a list of 24 emotion-laden words, 12 positive and 12 negative, for three study trials. After each study trial, participants will be asked to recall as many words as they can. After both a short and long delay, participants will be asked to recall the 24 studied words. Lastly, participants will perform a yes/no recognition task. We expect that our findings will enhance our understanding of the effect emotional laden words have for native versus non-native speakers of English. The practical and theoretical implications of these findings will be discussed.

Plasticity of Leaf Epidermal Patterning in *Solanum lycopersicum* and *Solanum habrochaites*

Mary L. Lee
Sponsor: Neelima R. Sinha, Ph.D.
Plant Biology

The recent drought in California highlights the need for an increase in basic plant research to find novel ways to produce crops with higher yields requiring fewer resources. In the domesticated tomato (*Solanum lycopersicum*) clade there are many poisonous, wild relatives which possess desirable traits such as resistance to pests, disease, cold, and drought. *Solanum habrochaites*, a wild species with many abiotic tolerances, has distinct epidermal patterning from *S. lycopersicum*, most notably in stomata, the pores by which plants respire. I hypothesize that the epidermal patterning in *S. habrochaites* remains plastic and thus will adapt with exposure to water stress whereas *S. lycopersicum* is unable to adapt. To answer this question, no fewer than 10 individuals of each species were grown in a Controlled Environment Facility and randomized into "no-water" and "normal-water" conditions. Tissue was harvested for analysis, LICOR 6400 measurements were collected at multiple time points, and plants were phenotyped at multiple time points. Together this data should provide ample evidence of adaptive response capacity in two species within the tomato clade while possibly providing insights into stress tolerance in crops.

Use of Withdrawal as a Contraceptive Method Amongst UC Davis Undergraduate Students

Samantha Lee
Sponsor: Leah Hibel, Ph.D.
Human Ecology

In the national data collected from the American College Health Association's National College Health Assessment (ACHA NCHA) Spring 2015 survey, 34.5% of undergraduate college student respondents reported using withdrawal as a form of contraception. In the data collected from the ACHA NCHA Spring 2015 survey at UC Davis, there was similar use of withdrawal with 30.4% of UC Davis undergraduate student respondents reporting use of withdrawal as a form of contraception. However, according to the CDC, withdrawal is one of the least effective forms of contraception with a 78% efficacy rate at preventing pregnancy with typical use. Additionally, withdrawal does not protect against transmission of sexually transmitted infections. In my research, I will be using data collected from the ACHA NCHA surveys at UC Davis in 2011, 2013, and 2015. I will be analyzing trends in use of withdrawal as a contraceptive method within the UC Davis population, specifically how undergraduate year and time in college influence contraceptive practices. Follow up research will focus on policies and student attitudes that may further explain the quantitative results from the ACHA NCHA data. The results from this research may help inform future areas for focus for contraception education.

Understanding the Function of ATG20 in Autophagy

Yongam Lee
Sponsor: Savithramma Dinesh-Kumar, Ph.D.
Plant Biology

Autophagy is important in maintaining homeostasis of cells under stress. Cells initiate a process of degradation of its own organelles or proteins via autophagy to recycle precious resources when a shortage of nutrients occurs. Since autophagy is involved in the degradation of endogenous proteins, autophagy needs to be tightly regulated in cells. Various proteins play important role in regulation of autophagy; formation of autophagosomes, and fusion of autophagosomes with lysosome vesicles. In the core mechanism of autophagy, mTOR inhibits ATG1 when nutrients are in excess. However, when there is a shortage, ATG1 phosphorylates ATG13 which recruits ATG8, causing the formation of the autophagosome membrane. Many more proteins have being identified whose precise function in autophagy remain unknown, like ATG20. In yeast, ATG20 interact with ATG1 complex, but in mammals, no homolog of ATG20 was found. Three types of ATG20 are present in *Arabidopsis*. In past months, I cloned *Arabidopsis* ATG20 with various tags, and I am currently working on optimizing the expression ATG20 using various expression strains of E.coli. Once I have optimized and purified ATG20, I will test the interaction of ATG20 with ATG1 in a vitro reconstituted system, which will shed some light on function of ATG20.

The Notion of Memory and Its Role in Quantifying Life Values

Amy E. Leong
Sponsor: Melissa Chandon, M.F.A.
Design

An unknown author once said, "A moment lasts all of a second, but a memory lives on forever." The role of memory and what is remembered becomes valuable to one's life experiences and perspectives. These memories create one's identity. The song "Seasons of Love" from the musical *Rent* illuminates the variety of ways for measuring a year in a life. My artwork emulates the design of Chris Jordan's "Running the Numbers" exhibition to examine how individuals value their lives, what drives humans to live each day, and suggest for viewers to measure their lives in love. For example, T. S. Eliot claims, I "have known the evenings, mornings, afternoons, I have measured out my life with coffee spoons." My art consists of gathering the number of objects used in a year (e.g. 365 coffee spoons representing how people count each day) and creating a multimedia mosaic from the objects (e.g. old man drinking coffee at home). The "spoons" are markers that represent a moment in time, a memory that lived on. My exhibition represents how we measure each day between social status, generations, and culture. An interactive element asks viewers, "What do you value in life?"

Synthesis of Zero Valent Iron Nanoparticles for Magnetic Particle Imaging

Kevin H. Leung
Sponsor: Angelique Y. Louie, Ph.D.
Biomedical Engineering

Magnetic Particle Imaging (MPI) is a novel imaging technique that generates an image by the excitation and detection of magnetic fields of magnetic tracers. MPI has shown great potential in a variety of biomedical applications including stem cell tracking, inflammation imaging, and angiography to assess cardiovascular diseases without harmful radiation. It is also a fast imaging modality with high sensitivity, high contrast, and millimeter scale spatial resolution. However, MPI currently utilizes iron oxide-based contrast agents used for magnetic resonance imaging, which are not ideal for MPI. With their better magnetic properties, we hypothesize that zero valent iron nanoparticles may produce higher signal intensity and better resolution in MPI. In this project, dextran-coated, zero valent iron nanoparticle were successfully synthesized via a sodium borohydride reduction and protected from oxidation by the biocompatible dextran coating. The size distribution of these zero valent iron nanoparticles were characterized via dynamic light scattering to be around 100 nm. The efficacy of these nanoparticles as MPI tracers were tested by characterizing the magnetic saturation and slope of the magnetization curve and shown to be advantageous compared with dextran coated iron oxide nanoparticles.

Developing an Antioxidant Nanoparticle-Based Biosensor for Magnetic Resonance Imaging (MRI)

Preston M. Leung
Sponsor: Angelique Y. Louie, Ph.D.
Biomedical Engineering

Changes in antioxidant levels, especially in glutathione (GSH) levels, correlate with cardiovascular disease and cancer. The ability to detect GSH imbalances early in a patient could allow for immediate, preventative treatment. However, current methods to measure GSH levels are limited by their inability to display real time GSH levels and their poor resolution. Magnetic resonance imaging (MRI), a non-invasive imaging technique with high spatial resolution, is capable of overcoming these limitations. Our research has pushed towards MRI contrast agents that utilize an activatable sensor attached to either gadolinium complexes or iron oxide nanoparticles, capable of detecting subtle changes in biological conditions. Previous studies have shown spiropyrans, activatable sensors, effective in detecting subtle changes in GSH. Here, we investigate the development of spiropyran-coated iron oxide nanoparticles (DIO-SP) that could allow for high-resolution mapping of GSH levels using MRI, and report the preparation and characterization of DIO-SP. Using UV-visible spectroscopy, phantom MRI, and other methods to demonstrate the ability of DIO-SP to sense GSH changes, we showed that these DIO-SP can give both visual and quantitative information on changes in GSH levels. These studies provide a new way of detecting antioxidants in the body – redefining what is possible in biomedical imaging.

Feminist Punk Rockers and New Media Fan Communities: How Patti Smith and Carrie Brownstein's Music and Memoirs Kindle a Generation of Music Rebels

Rachel P. Levin
Sponsor: Julie Sze, Ph.D.
American Studies

In the past three decades, women in punk rock music propose a critique of rock's tradition and masculinity. How do iconic women punk rockers use punk as a platform for gender identity formation and how do they shape a new generation of activist fans? In both Patti Smith's *Just Kids* and Carrie Brownstein's *Hunger Makes Me a Modern Girl*, these artists use memoir to define the gendered oppressions and triumphs of women in the music industry, and their experiences of riot grrrl and feminist punk. How have gendered experiences shaped the narratives of these two women rockers and their contemporaries? Using a close reading of the lyrics and music videos of Smith and Brownstein, and analysis of the work of bloggers and musicians in feminist artistic spaces, I examine how the artists and fans contribute to contemporary sexual liberation debates. Platforms include Kate Nash's Girl Gang Movement, in which Nash encourages young adults to participate in intersectional fourth wave feminist discourse. I argue that the relationships between Smith and Brownstein and their fans resist the division between artist and audience, and instead construct a collaborative effort in search of gender equality in the industry.

In Response to AB 1826: How The Redirection of Food Waste From California's Landfills Will Alter Greenhouse Gas Emissions From Compost

Stephanie Lew
Sponsor: William Horwath, Ph.D.
Land, Air & Water Resources

Our project focuses on comparing greenhouse gas (GHG) emissions from a compost pile containing green waste and a compost pile containing both green waste and food waste. An increasing amount of food waste is being diverted from landfills to decrease methane emissions. We are investigating how GHG emissions may differ with composts containing food waste. The insight will help improve industrial compost systems and thus, comply more with AB 32, a bill that aims to reduce GHG emissions from California. The compost piles were turned four times in the first fifteen days and continue to turn the pile once per week to homogenize the pile, add oxygen and ensure high temperatures to eliminate pathogens. Nitrate, ammonium, and dissolved oxygen content were determined from compost samples and GHG analyzed from gas samples. Temperature, moisture, and percent oxygen measurements are also taken. The data will allow us to quantify, predict, and compare GHG emissions between the two piles. Data collection will span throughout winter quarter.

Biochemical Regulation of Bim1 Complexes During Anaphase Spindle Elongation

Nichole A. Lewis
Sponsor: Kenneth B. Kaplan, Ph.D.
Molecular & Cellular Biology

In order to maintain chromosome integrity, replicated sister chromatids must be resolved and segregated to each daughter cell prior to completing cell division. Findings from our lab suggest that a chromosome integrity pathway is activated by the presence of tangled sister chromatids (i.e., physically linked) that signal through the Aurora B kinase to affect anaphase spindle dynamics. A proposed target of this pathway is the microtubule plus-end binding protein, Bim1. Phosphorylation of Bim1 by Aurora B has been proposed to reduce Bim1 affinity for microtubules, although the underlying biochemical mechanism is unclear. Bim1 phosphorylation is delayed in the presence of tangled sister chromatids, causing the spindle midzone to expand and increasing spindle forces acting on tangled sister chromatids. Biochemical analysis of Bim1 complexes in cells with tangled sister chromatids led me to hypothesize that phosphorylated Bim1 interacts with a negative regulatory protein complex that is released upon dephosphorylation. Based on reported large-scale interaction surveys, I will test the prediction that phosphorylated Bim1 forms an inhibitory complex with a 14-3-3 protein, Bmh1. I will discuss how my findings to date hint at novel regulatory mechanism for controlling spindle dynamics.

Construction and Developmental Effects of In-Frame Deletions on *Myxococcus xanthus* Development

Jennifer Liang
Sponsor: Mitchell Singer, Ph.D.
Microbiology & Molecular Genetics

Myxococcus xanthus (*M. xanthus*), a Gram-negative species belonging to the Myxococcaceae family are ubiquitous social soil bacteria. During high nutrient levels, bacterial cells form colonies only a few cells thick, swarming away from the center of the colony, and toward the edge of the colony. However, during low nutrient levels, cells move inward, forming aggregates, known as fruiting bodies, that later sporulate. In order to identify genes that may play a role in the development of fruiting bodies, in-frame deletions of genes are made. This was done on gene 3735 and delay in development of fruiting bodies was observed. It is hypothesized that gene 3735 controls the amount of cyclic di-GMP, a signaling molecule, that *M. xanthus* produces. In addition to gene 3735, several other genes belonging to the extracytoplasmic factor subfamily of RNA polymerase sigma-70 factors are being made. These genes are assumed to play an important role in development—sigma factors are proteins required for RNA polymerase to specifically bind to promoter regions of genes, allowing transcription. Deletions of these genes will allow us to understand if these genes are required for development, and if so, what other genes they might control.

Calibrating Relatedness Estimates in the Sandcastle Worm *Phragmatopoma californica*

Alexander C. Lieu
Sponsor: Richard K. Grosberg, Ph.D.
Evolution & Ecology

One of the long-standing questions regarding marine invertebrates is whether larvae disperse together in familial clumps, or in groups of distantly related individuals. By looking at patterns of genetic diversity we can infer a species' migration history and connectivity. Estimating connectivity is a necessary effort to understand how patterns of dispersal affect evolutionary and ecological processes and patterns, such as gene flow, local adaptation, and population persistence. I will use genetic markers to estimate relatedness of individuals within a population of marine worms. However, estimates of relatedness have been known to vary between methods used and also between populations sampled. Therefore, calibrating the markers is a pivotal step towards answering the question regarding larval dispersal. To do this, I will rear *P.californica* larvae, extract, amplify, and genotype their DNA, and then utilize computer programs to test the degree of bias of each estimator against our known levels of relatedness. Thus far, I have over two hundred larvae ready for DNA extraction, amplification, and genotyping. In summary, to answer complex questions regarding dispersal and relatedness, I first need to ensure our tools for doing so are accurate.

Victorian Women and Their Collaborations With the Foreign and Forbidden in *The Beetle*

Austin B. Lim
Sponsor: Kathleen Frederickson, Ph.D.
English

Published at the tail end of the Victorian era, Richard Marsh's horror novel *The Beetle* is superficially an account of a diametric supernatural conflict which pits the titular Egyptian monster against London, the civilized imperial city. Many critics, however, agree that *The Beetle* also catalogs decay within London itself through representations of urban breakdown and disruptions of class and gender. To reorient previous analyses of this sort, I examine two marginal female characters who have received little critical attention even though they rent their living quarters to the beetle, inadvertently implicating themselves in its plot. Arguably, their collusion with the monster evidences the text's simultaneous recognition and vilification of economically autonomous women. They are aligned with a Victorian iconography of crime as their premises shelter the beetle and enable it to kidnap and maltreat vulnerable characters. In addition, by entering into consensual economic relationships with the foreign monster and by giving it access to domestic space, they not only facilitate its scheme and jeopardize femininity; they also unsettle the boundary between invader and immigrant. Scrutinizing their place in *The Beetle* reveals that the novel coordinates its judgments about gender and class with its concerns about nationhood.

Shifting the Public Perception of Disabilities via Children's Books

Jason Lin
Sponsor: Glenda Drew, M.A.
Design

Having a disability often carries much more weight than a physical or mental limitation. Society's stigma against those with disabilities and illnesses often leads to social exclusion and a lack of resources; the word "disability" carries a lot of negative connotation in itself. Visual communication design can be used as a tool to shift perception of disabilities as a set of limitations towards a positive message of neurodiversity that emphasizes the abilities and unique experience of living with disabilities. It forces parents, teachers, and community members to think much more critically about how people with disabilities are treated. Designing and effectively communicating stories of inclusion through children's books helps remove common misconceptions and introduces key ideas at a very early age to help assist in both raising the next generation to be much more accepting and igniting the societal shift in behavior that is necessary to remove the stigma surrounding disability.

Assessment of Mating Behavior in Rhesus Macaques Receiving Hormonal Contraception

Nicole Lin
Sponsor: Robert Kimsey, Ph.D.
Entomology & Nematology

Rhesus macaques at the California National Primate Research Center were given Depo-Provera®, a hormonal contraceptive also used by humans. This was the first time this method was used on a large scale among macaques living in outdoor social groups. While the effectiveness of this treatment to prevent pregnancy has been established, there was no previous data regarding how it affects mating behavior. During rhesus macaques' breeding season (September to January), female-male pairs normally display distinctive mating behavior consisting of consortships and sex-mounts. In the treatment cage, all adult females were treated with a dose of Depo-Provera® in late September and again in early December. The rate of mating behavior among adult females in the treatment cage was observed and compared with that of adult females in an untreated cage on a weekly basis throughout most of the breeding season. Females in the treated cage showed little or no mating behavior at most time points, a clear difference from rates in the control cage. These results suggest that Depo-Provera® can affect social behavior as well as pregnancy in rhesus macaque colonies, and may have implications for population management in primate research centers.

The Museum of Jurassic Technology in Context of the History of Museums

Emma Lingel-Gary
Sponsor: Diana Strazdes, Ph.D.
Art & Art History

When studying the history of museums it is easy to compare modern institutions with those of the past. By studying one such comparison, the contemporary Museum of Jurassic Technology in Los Angeles, California and the historical Peale's Museum once located in Philadelphia, Pennsylvania, one finds that the legacy of museums and their many forms throughout history continues to inform the work of modern museologists. The Museum of Jurassic Technology is a self-aware institution meant to make the visitor question not only their conceptions of art and natural history, but also their expectations of museums. This radical approach to museum studies would be impossible without the model of Peale's Museum, the first natural history museum, to mimic and intentionally diverge from. Comparison of the contents, method of presentation, rhetoric of museum literature, and the goals of the respective founders of each institution reveals how the Museum of Jurassic Technology simultaneously demonstrates and scrutinizes the legacy of cabinets of curiosities on museum studies.

The Use of Replicative Studies in Understanding Material Selection Strategies for Fishhook Production on San Nicolas Island, CA

Chang Liu
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

Single piece shell fish hooks revolutionized the late Holocene fishery of coastal and insular Southern California. Over the past 30 years of archaeological research on the Channel Islands it has been noted that assemblages from the northern islands are dominated by hooks produced from California mussel, while assemblages from the southern islands are dominated by hooks made from red abalone. Conventional approaches aimed at addressing these differences typically site cultural preferences, ecology, and resource depression to explain this variation. Sea surface temperature data indicate differences in innertidal and subtidal productivity between the northern and southern islands which may help explain why red abalone hooks appear less frequently on the northern chain. However, California mussel is vastly more abundant than red abalone on the northern and southern chain of the Channel Islands and previous research fails to adequately explain the relative dearth of mussel fishhooks on the southern islands, especially San Nicolas Island. This poster uses a technological approach and experimentally derived data to further address why Chumash and Gabrielino craftspeople produced fishhooks from disparate shellfish species. Special attention is paid to methods of production, efficiency, and lithic raw material constraints.

Evaluation of Current Fungal Identification Methods at UCDMC and Development of Quantitative PCR Assay for Direct Detection of *Candida* spp.

Chung Heng (Peter) Liu
Sponsor: Anna M. Romanelli, Ph.D.
Pathology & Laboratory Medicine
School of Medicine

Invasive fungal infections (IFIs) are a major contributor to morbidity and mortality, particularly in high-risk populations, including HIV/AIDS, transplant, cancer, burn/trauma patients, and those in the intensive care unit (ICU). Fungal infections have been on the rise in immunosuppressed patient populations who are particularly vulnerable to these infections. Culture, along with microscopic and macroscopic morphology, remains to be the gold standard for fungal identification. However, this method has proven to be labor intensive, requires expertise that is slowly going away as our senior laboratory technologists begin to retire, and can take anywhere between several days to weeks to grow well enough for an identification to be made. The first goal of this study is to highlight the need for a more rapid and reliable method of identifying *Candida* species by looking at the turnaround time (TAT) of the current identification method at UC Davis Medical Center from January 2011 to December 2015. The next objective of this study is to develop multi-target, customizable assays that detect *Candida* infections directly from patient specimens on real-time PCR in order to reduce the turnaround time.

Follow the Money or the (Party) Leader: The Effects of 'Yes' and 'No' Spending on California Citizen Initiative Outcomes

Michelle Livingstone
Sponsor: Erik Engstrom, Ph.D.
Political Science

Research has shown that parties and interest groups exert influence over initiative election outcomes in California through position-taking and campaign spending, defying the intentions of Progressive reformers who instituted direct democracy so that voters could bypass the influence of party and business elites to enact laws. An update by de Figueiredo, Ji, and Kousser (2011) to the conventional wisdom that opposition spending had a significant effect on California initiative outcomes, while support spending did not, applied advanced techniques and found symmetrical effects of support and opposition spending on initiative outcomes from 1976 to 2004. However, their research failed to consider the influence of party support or opposition positions on California voters' decision-making. This research updates the model employed by de Figueiredo et al. (2011) by collecting data on California citizen initiatives from 2005 to 2014, including a measurement for the presence of party positions. I find higher levels of spending and increased marginal effects of support and opposition spending on initiative outcomes compared to previous years. The presence of party positions decreased these effects. These findings provide further evidence that on some issues, parties and interest groups' positions and spending on California initiatives can influence election outcomes.

Development and Functionalization of Mesoporous Silica Nanoparticles for Drug Delivery

Allison L. Lo
Sponsor: Pieter Stroeve, Ph.D.
Chemical Engineering & Materials Science

Recent advances in nanotechnology have made it possible to develop nanoscale materials for imaging and targeted drug delivery. A promising candidate is mesoporous silica nanoparticles (MSNs), which contain a large surface area and pore volume suitable for protein delivery. I am investigating the synthesis of modified MSNs by expanding the pores for adsorption of larger proteins, using polyethyleneimine (PEI) and polyethylene glycol (PEG) as pore modifiers to increase protein stability, and using the temperature-sensitive polymer Poly(N-isopropylacrylamide) (PNIPAM) as a gating mechanism for controlled release. The modified MSNs will be tested with lysozyme and bovine hemoglobin (BHb). Initial studies on PEGylated MSNs showed increased BHb release when compared to non-PEGylated MSNs. Expanded-pore PNIPAM-PEG MSNs were synthesized using atom transfer radical polymerization (ATRP) and will be characterized using infrared (IR) spectroscopy, dynamic light scattering (DLS), and scanning electron microscopy (SEM). Initial studies indicate increased BHb release at increased temperature due to the PNIPAM gate. Expanded-pore PNIPAM-PEG MSNs demonstrate the potential to be used for novel drug storage and delivery applications in the biomedical field.

Bridging the Gap: A Preliminary Study of the Racial, Ethnic, and Linguistic Divide in the California Home Visiting Program

Jamie Loey
Sponsor: Jeanette B. Ruiz, Ph.D.
Communication

Patient-centered care is at the forefront of the healthcare industry and aims to empower the patient voice. Due to the large demographic changes in the United States, the patient voice represents a wide range of ethnicities, cultures, and languages. However, the number of ethnically diverse healthcare providers is not paralleling the growing California minority population leading to a disconnect between healthcare providers and patients. There has been a large body of literature that has investigated the racial, ethnic, and linguistic concordance between physicians and their patients, but little research has been done to investigate the racial, ethnic, and linguistic concordance between home visitors and participants. The purpose of this study is to extend the research on physician-patient racial, ethnic, and linguistic concordance to home visitors and participants in the California Home Visiting Program (CHVP). This paper assesses whether there is a racial, ethnic, and linguistic concordance between home visitors and participants through an observational study of participant and home visitor demographics in 22 counties during the Federal Fiscal Year 2014-2015. The results highlight the need to restructure the U.S. Census Bureau's definition of race and ethnicity and the unmet needs of participants in the CHVP.

MXAN_5889: A Receiver Domain Protein Required for Development in *Myxococcus xanthus*

Matthew Long
Sponsor: Mitchell Singer, Ph.D.
Microbiology & Molecular Genetics

Myxococcus xanthus is a species of myxobacteria found ubiquitously in soils. When nutrients are scarce, these social Gram-negative bacteria congregate and form multicellular fruiting bodies, which house myxospores. Myxospores are the bacteria's dormant state and represent a novel terminal cell type produced by this process. One goal of our lab is to define the regulatory networks that control this developmental process. After a deletion in the MXAN_5889 gene, *M. xanthus* cells developed significantly slower than wild type cells, demonstrating the importance of this gene. During my analysis, MXAN_5889, *M. xanthus* cells showed varying developmental speeds; developing at the speed of the control wild type when plated on CTTYE agar plates, but developing slower than control wild type when grown in submerged cultures. Here I report my ongoing research to further characterize spore and developmental variations caused by the deletion of the 5889 gene. This will help characterize the gene's impact in development and sporulation.

The Role of the Hippocampus in Context-Dependent Psychomotor Sensitization to Morphine

Tyler D. Longenbaugh
Sponsor: Brian Wiltgen, Ph.D.
Psychology

Mice and rats demonstrate psychomotor sensitization and tolerance to administration of morphine. Previous studies have shown that the occurrence of these phenomena is governed by the environment that the drug is administered in (Siegel, 1978). Therefore, the physiological presence of the drug –and, by extension, the pharmacokinetic mechanisms associated with its metabolism—is not purely responsible for the sensitization or tolerance to its effects. This indicates that associative learning is involved with the expression of behavioral sensitization and tolerance. An abundance of research has revealed the hippocampus as being directly responsible for encoding contextual representations (Rudy, 2009). Here we explore the putative role of the hippocampus in mediating the context-dependent psychomotor sensitization of mice to injections of morphine in a two-injection protocol (Valjent et al., 2010). Subsequently, mice were given bilateral lesions to the dorsal hippocampus prior to behavioral testing. Future work will utilize transgenic mice in conjunction with optogenetics to selectively label and optically silence neurons active during the initial injections.

Comparative Genomics of *Fusarium oxysporum*

Lia Lopez
Sponsor: Thomas R. Gordon, Ph.D.
Plant Pathology

We will be focusing on two strains of *Fusarium oxysporum*, one pathogenic to tomato and another pathogenic to strawberry. When comparing the genome sequence of the two strains we observed that there are segments that can only be found in one or the other strain. Parts of the *Fusarium oxysporum* genome have been characterized as "accessory" based on the absence of genes critical for the normal functioning of the organism, and an enrichment of transposons, repetitive sequences, and pathogenicity-related genes. We hypothesize that the parts of the strawberry-infecting *Fusarium oxysporum* strain that are absent from the tomato pathogen can be considered its accessory chromosome. Additionally, we hypothesize that though these regions cannot be aligned they will share evolutionary origins, and protein coding sequences will be more similar within the species than to closely related organisms. To test this hypothesis we will extract protein coding sequences from genes found in the accessory genomes, align these sequences, and use them to build phylogenetic trees. If our hypothesis is correct, the genes found in these two strains will be more similar within the species than to other closely related species.

Genetic Factors Implicated in an Autism Mouse Model

Shreya Louis
Sponsor: Alex Nord, Ph.D.
Neurobiology, Physiology & Behavior

Autism Spectrum Disorder is a disease characterized by repetitive behavior, and deficits in social interaction. While autism is currently only diagnosed clinically, genetic factors play an underlying role. We are studying genes that are involved in the genetic etiology of ASDs in order to better understand the causal factors. We have used genomic technologies to study changes of gene expression in a mouse model of autism. After performing deep sequencing (RNA-seq) to characterize the transcriptome of the wild type and autism model, we performed a differential gene expression analysis to identify genes that changed expression in our autism model. The subsequent genes were then targeted using qPCR techniques. The qPCR results validated our RNA-seq results, showing the majority of target genes were deferentially expressed at embryonic day 14.5, which is a critical window of neurogenesis that appears changed in our model. Further work is needed to study the underlying pathways and cell types of these pathological changes to better understand the neurodevelopment of autism.

Vocabulary Selection and Lexical Frequency in Elementary Spanish Textbooks

Lani G. Lopez Bastidas
Sponsor: Claudia H. Sanchez-Gutierrez, Ph.D.
Spanish & Portuguese

The aim of second language (L2) teaching is to ensure that students are able to communicate in real-life situations. In this context, the vocabulary included in L2 textbooks should be a reflection of the words used by native speakers. Also, it was demonstrated that a minimum of 10 exposures to a word favors its long-term retention (Pellicer-Sanchez & Schmitt, 2010). Therefore, in order for a textbook to be useful for vocabulary learning, it should contain words that are frequent in native speakers' speech and present those repeatedly across its pages. The aim of our study is to determine to what extent a corpus of 14 elementary Spanish textbooks meets these criteria. We first compare the 2000 most frequent words in the textbooks with the 2000 most frequent words in a native speakers frequency dictionary (Davies, 2006). Then, we focus on observing if the words that were present in both corpora had 10 or more occurrences in the textbooks. The results offer an insight into the specific vocabulary mismatches between native and non-native written input. Finally, some suggestions for pedagogical uses of the data will be discussed.

Physical and Mental Activities in Older Adulthood Predict Cognitive Abilities

Joanne Lu
Sponsor: Beth A. Ober, Ph.D.
Human Ecology

Previous research shows that physical exercise (Hayes et al., 2013) and mental exercise (Sterns & Munn, 2010) are beneficial for cognitive functioning in individuals with Alzheimers or dementia. Less research has focused on how daily activities predict specific aspects of cognition in late adulthood. The purpose of this study is to look at how individuals' participation in activities of daily life predict cognitive abilities five years later. This study includes 2,832 adults between 65 and 94 years-old who were part of the ACTIVE study (Tennstedt et al., 2010). Results showed that one's ability to perform complex activities independently (e.g., preparing meals) predicts their ability to recall information without intrusion errors (β = -.06) and to recognize signs and symbols (β = -.04). Less complex activities (e.g., personal hygiene) predict individual's ability to maintain vision (β = -.06). Further, mental exercise (i.e., solving puzzles) predicts individual's ability to recall words (β = -.04), and physical exercise (i.e., walking) predicts ability to recall without intrusion errors (β = -.15). These results suggest that the ability to engage in daily activities and the more daily activities one engages in can be beneficial to maintaining memory, recognition, and vision later in life.

An Ego-Network's Influence on Transportation Mode Choice Conformity

Louis T. Lubow
Sponsor: Mark Lubell, Ph.D.
Environmental Science & Policy

In our society, individuals form relationships with one another. The strength of these relationships, hereon referred to as tie strength, vary person to person. There are a number of potential indicators of tie strength including closeness, duration, and frequency of contact in a relationship (Marsden and Campbell 1984). The decision making of an individual, the ego, may be influenced by the choices made by those whom they have relationships with, the alters. We expect the decision making of the ego to correlate with the decisions made by the alters with whom the ego has the strongest relationships with. Specifically, we will use survey data from Davis, California to explore how an individual's mode of transportation is influenced by the mode choice of others in their social network. This study investigates the impact of the ego network's overall influence on ego mode choice. The three indicators listed above will be used as measures of tie strength.

Culturing Bacterial Isolates From the Seagrass Microbiome

Karley M. Lujan
Sponsor: Jonathan Eisen, Ph.D.
Evolution & Ecology

Seagrass plays an essential role in the marine ecosystem and is the host of a beneficial microbiome. Studying this microbiome can lead to a better understanding of seagrass health therefore helping entire marine ecosystems. Previous research on seagrass has identified the presence and location of different microbes along the seagrass leaves and roots. This project focuses on culturing the microbes from seagrass samples in order to identify them and sequence their genomes. Nitrogen-fixing organisms are of particular interest for their potential role in the health of seagrass beds. I selected culture samples from the seagrass roots, leaves, and surrounding sediment then cultured them on agar plates and in liquid media. After discovering which microbes can be cultured, the goal is to refine the culturing methods. Our current investigation has shown that growing microbes from the seagrass microbiome is possible through standard techniques. However, through further investigation we hope to vary the culture conditions to identify novel or essential microbes. Working on culturing these microbes is helpful for future projects involving the seagrass microbiome; such projects include those that focus on improving the success rate of seagrass restoration efforts.

Relationships Between Emotion Memory Task Performance and Parasympathetic Activation

Austin Lui
Sponsor: Paul D. Hastings, Ph.D.
Psychology

Children's executive functions (EF) reflect cognitive self-regulation abilities, including working memory (WM). Polyvagal theory suggests that EF is supported by activity of the parasympathetic nervous system. Respiratory sinus arrhythmia (RSA), an index of parasympathetic regulation, has also been linked with emotional self-regulation. Few studies have examined RSA in relation to the juncture of cognitive and emotional regulation, or "hot" EF. We predicted that moderate RSA suppression would support better hot WM performance. We examined 52 6 year-old children's emotional and non-emotional WM while measuring RSA. Preliminary analyses of 32 children are described here. Each child completed five WM card games, matching cards in decks that presented mixed, positive, negative, or non-emotional stimuli. Consistent with other studies on EF performance, preliminary results showed that children made increasing memory errors as the task went on, with the last deck having the most mistakes. RSA also tended to increase throughout the task, indicating greater RSA engagement. Children who made the most WM mistakes, particularly in the first decks, exhibited higher RSA throughout the task, which would be consistent with predictions. Analyses of data from the entire sample will be presented in the final poster.

Roles of Topoisomerases in Meiotic Recombination

Christopher Ma
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Meiotic recombination initiates with the formation of hundreds of DNA double strand breaks. These breaks are repaired through homologous recombination, where various intermediate joint molecules form and are then processed into crossovers or noncrossovers. Joint molecules must be resolved for proper chromosome segregation to occur. Defective recombination can lead to disorders such as those caused by aneuploidy, so recombination must be highly regulated. Topoisomerases (Type 1: Top1 and Top3, Type 2: Top2) regulate DNA metabolic processes, including replication and transcription. Our research has shown Top3 to be required for the timely resolution of joint molecules and facilitating chromosome segregation during meiosis. Top2 has been shown to be required for homologues to separate during meiosis I. The meiotic function of Top1 has not been clear thus far. In this project, we investigate genetic interactions between the three topoisomerases. In addition, our research shows that the Structural Maintenance of Chromosomes (SMC) 5/6 complex regulates a subset of joint molecule resolution and facilitates chromosome segregation in meiosis. Top2 cooperates with the SMC 5/6 complex in chromosome segregation in somatic cells; therefore, we are also interested the genetic interaction between the SMC 5/6 complex and the topoisomerases during meiotic recombination.

The Effect of Dose on the Onset and Progression of Radiation Induced Brain Necrosis in the Rodent Model

Htet S. Ma
Sponsor: Laura Marcu, Ph.D.
Biomedical Engineering

Radiotherapy is a standard treatment used for brain tumors, but can often cause undesired necrosis of nearby healthy tissue. When investigating novel methods to reduce or detect the formation of necrosis, animal models are commonly employed. Currently, the relationship between dose to the rate of necrosis progression and time to onset in these models is not well understood. Most studies use a single 40 Gy dose, with little empirical justification for this value, which produces necrosis in approximately 25 weeks. In order to better understand the effect of dose on the generation of necrosis, we conducted a study in which rats were treated at doses between 20 and 60 Gy. Biweekly MRI images were then acquired and analyzed using an automated comparison of pixel intensity technique to quantify the necrosis volume. Findings indicate that the time to necrosis onset is dose dependent, but after the initial onset, the necrosis progression rate is constant across different doses. Additionally, it was found that doses less than 30 Gy never generated necrosis. The results thus demonstrate that 60 Gy is a more effective dose, as it generates the same pathological necrosis five weeks earlier than the 40 Gy dose commonly used in experiments.

A Study on Photo-Active Functions of Polyphenolic Acids

Yue Ma
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Polyphenolic acids, as a kind of naturally based green reagents, possess excellent antibacterial properties like other synthetic antiseptics. These chemicals were found photoactive under ultraviolet (UV) irradiation recently, however, the relevant mechanism of their photo-active functions was still unclear. In this study, the structural, spectral, and photo-active properties of the four typical polyphenolic acids (gallic acid, ferulic acid, caffeic acid, and chlorogenic acid) were investigated. UV-vis spectroscope analysis revealed that the ferulic acid, caffeic acid, and chlorogenic acid had a similar wide absorption peak around 330 nm, and the chlorogenic acid exhibited the highest absorption intensity. Meanwhile, the gallic acid showed a relatively low absorption peak around 280 nm. Time-dependent DFT (TD-DFT) method was used to simulate the conjugated structure of these polyphenolic acids, and the calculated excitation energies matched well with the experimental absorption bands. Moreover, the photoactivity of these polyphenolic acids were characterized with presence of hydroxyl radicals, quantitatively measured with p-nitrosodimethyl aniline (P-NDA) solution under UVA (365 nm) exposure. The results reveal that the photo-activity of the polyphenolic acids is related to the conjugated structures of the compounds. The photo-active functions could be applied in preparation of antimicrobial materials for a wide range of fields.

Changes Induced by Combined Environmental Factors and Pathogen Infection in Grapevine

Antoinette F. Machado
Sponsor: Walter D. Gubler, Ph.D.
Plant Pathology

Plant diseases can result from the interaction of several factors. Esca of grapevine is a disease thought to result from an interaction between environmental factors and microbial infection. This disease is associated with specific fungi living in the xylem (water-transporting vessels) of grapevines and many times manifest itself during periods of drought. We conducted a greenhouse study to understand why water stress induces the appearance of esca disease symptoms. Young grapevine plants were infected with esca-associated fungi. The infection was allowed to establish for six weeks and after this time a water stress was applied for seven weeks. The plants were evaluated for the effect of the combined stresses. External appearance, growth and amount of xylem sap collected seemed to be more affected by water stress than fungal infection. The pH of xylem sap did not seem to be influenced by either water stress or fungal infection. At the time of harvest, thirteen weeks after inoculation, live fungi were recovered from the plants showing that infection was successful. However, major visible differences seemed to be mainly due to water stress. Further investigation of the components present in the xylem sap are necessary to determine changes induced by fungal infection.

The Power of Belonging: Testimonios of Undocumented Chicanas and Latinas at UC Davis

Ana E. Maciel
Sponsor: Susy Zepeda, Ph.D.
Chicana & Chicano Studies

The number of undocumented students at the University of California system has increased, and the dire need for adequate student services on higher education campuses. Although immigration policy has not changed at the federal level, at UC Davis the number of undocumented students almost doubles every year. Undocumented students have historically experienced a shortage of resources to help them navigate their journey through higher education. In recent years, more undocumented student resources, such as programs and centers, have been established throughout the state of California. This research will explore the deeper implications student services have on undocumented Latinas/Chicanas/Xicanxs at UC Davis. I will analyze their *testimonios*, personal narratives, using feminist and Chicana theory to measure the impact of such services at UC Davis through the AB 540 and Undocumented Student Center. By analyzing the retention, educational experience and personal success I will propose and highlight ways to serve the undocumented student population on college campuses and seek ways to create holistic and centralized undocumented student centers throughout the nation.

Genetic Investigation of a Novel Eye Color 'Tiger Eye' in Puerto Rican Paso Fino Horses

Maura K. Mack
Sponsor: Rebecca Bellone, Ph.D.
Population Health & Reproduction
School of Veterinary Medicine

A unique eye color, called "tiger eye", is found in the Puerto Rican Paso Fino Horse breed and is characterized by a yellow, amber, or bright orange iris coloration. Pedigree analysis of 205 individuals identified a simple autosomal recessive mode of inheritance for this trait. A genome-wide association study was performed with 14 tiger and 10 non-tiger individuals. Using a homozygosity mapping approach we identified a 5.6 Mb region on equine chromosome 1 (ECA1) as the most significantly associated locus ($p_{corrected}$ = 0.01). A candidate gene, Solute Carrier Family 24 (Sodium/Potassium/Calcium Exchanger), Member 5 (SLC24A5), from this locus is known to cause a golden pigmentation in zebra fish and is implicated in skin color variation in humans. The coding region of this gene was sequenced in two "tiger" and 1 brown eyed horse and a deletion of 628 bp including all of exon 7 (ECA1:141,660,611 – 141,661,239) was identified in a "tiger eyed" sample. This deletion is currently under investigation as the cause for the "tiger eye" phenotype.

Proposing an In-Depth Examination of Working College Students' Experiences

Elisa Magallanes
Sponsor: Marcela Cuellar, Ph.D.
School of Education

Working among postsecondary students has become almost necessary in order to navigate the substantial gap between income and increasing tuition fees. More than 80 percent of undergraduate students work part-time, which research shows has both disadvantages and benefits. Working longer hours can delay graduation and slightly decrease GPA. However, working during college can also help students acquire and improve soft skills, such as time management, problem solving, and communication skills. These earlier studies have primarily explored this relationship through quantitative approaches and have focused on homogeneous groups of students. Additional literature suggests the importance of designing and implementing work-study programs to prepare working students for their future careers. This presentation will review the existing literature, while proposing a qualitative study based on a diverse group of students, which will contribute a more in-depth examination of working college students' experiences. Additionally, this study will look at the connections postsecondary students make between work, academics, and life goals. Understanding how students connect work experiences to long-term aspirations can help colleges and universities capitalize on the benefits of working during college by providing spaces in which students can integrate what they are learning in college and their work.

Investigating Meiotic Modifications: Disrupting PCNA SUMOylation in Budding Yeast

Meghan Mahalawat
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Meiosis is the process by which haploid gametes are produced as a result of reductive cellular divisions of diploid cells. During meiosis, homologous chromosomes undergo DNA recombination, which ensures appropriate segregation of homologs into daughter cells. Failure of chromosome segregation produces aneuploid gametes, which can lead to infertility, and birth defects such as Down syndrome. Homologous recombination is regulated through multiple post-translational modifications of proteins. SUMO (Small Ubiquitin-like Modifier) is a post-translational modification that is crucial to the successful completion of meiosis. Our lab studies the effect of SUMOylation on the stability and function of proteins involved in meiotic homologous recombination, including PCNA, the eukaryotic replication clamp. Our screen for proteins SUMOylated during meiosis in budding yeast showed that PCNA is SUMOylated at DNA sites lysines 127 and 164. We used site-directed mutagenesis to mutate these sites individually and together into arginines to disrupt SUMOylation. We then assessed the effects of these mutations on the meiotic program by measuring spore viability and homologous recombination. We will then conduct an assay on the cells with the mutations. This process will allow us to determine the effects of SUMOylation disruption in meiosis on PCNA.

Purification of Alpha 1-Antitrypsin From Tobacco Plants via Membrane Adsorption Chromatography

Kathryn Mains
Sponsor: Karen McDonald, Ph.D.
Chemical Engineering & Materials Science

Alpha 1-antitrypsin (AAT) has been transiently expressed in whole tobacco plants in the hopes of creating a quick and inexpensive platform for the production of this therapeutic protein. In this study, commercially available lab-scale anion exchange membrane chromatography capsules were investigated as a potential inexpensive downstream processing alternative to traditional resin based chromatography. Recombinant tobacco extract was mimicked by spiking wild-type tobacco extract with purified human AAT at an appropriate concentration. The major impurity, over 75% of the total soluble protein (TSP), within the tobacco extract was identified as a large subunit of the tobacco native protein ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco) with an isoelectric point of 4.5, compared to that of 4.7 for AAT. Initial findings show that in order to make anion exchange membrane chromatography a viable purification scheme, the Rubisco content within the tobacco extract must be reduced prior to column loading. Various TSP-reducing methods will be attempted, and the most successful method on the basis of reducing TSP while recovering the most active AAT will be placed in the workflow prior to the anion exchange chromatography step. Parameters and operating conditions for ion exchange membrane chromatography will then be selected for the highest recovery and purity of AAT.

Infants Association of Objects Based on Fearful or Neutral Faces

Sydney Maniscalco
Sponsor: Susan Rivera, Ph.D.
Psychology

Adults often use fearful expressions to convey a potential threat or danger to an infant, and in turn, infants can use these facial expressions to assess objects in their environment. Prior event-related potential (ERP) studies have reported that 3- and 6-month-old infants devote more attention to objects previously gazed upon by a fearful face compared to a neutral face. By contrast, 9-month-olds devote more attention to objects associated with a neutral face. This research project used infrared eye-tracking methods to examine the developmental difference in attention distribution to neutral versus fearful facial expressions between 6 and 12 months of age. Six-, 9-, and 12-month-olds were shown a video of a woman with either a neutral or a fearful facial expression looking towards one of two objects on the screen. The face then disappeared from the screen and the infants saw just the two objects. Preferential looking time to each of the objects was recorded to obtain group averages. Across all three age groups infants preferentially looked at objects cued by a neutral facial expression. Additional analyses will be performed to explore these developmental results, and possible reasons for our 6-month-old data being inconsistent with previous ERP findings will be discussed.

The Molecular Components That Regulate Sperm DNA Position in *C. elegans* Meiotic Embryos

Harold C. Marin
Sponsor: Francis J. McNally, Ph.D.
Molecular & Cellular Biology

Female meiosis is essential for reproduction in animals. During female meiosis, the meiotic spindle mediates a reduction in chromosome number such that a diploid state is restored by fertilization. Fertilization occurs during female meiosis in most animals, which suggests the presence of a mechanism that prevents interaction between the meiotic spindle and the sperm DNA. In *C. elegans*, the sperm DNA is positioned in the opposite third of the embryo from the meiotic spindle. Depletion of profilin, a protein required for polymerization of F-actin, results in the sperm DNA being closer to the meiotic spindle. This has led to the hypothesis of a cytoplasmic actin network maintaining sperm DNA position away from the meiotic spindle. Depletion of proteins known to interact with F-actin in *C. elegans* followed by fixed immunofluorescence of meiotic embryos has been performed to test this hypothesis. The sperm DNA was not positioned closer to the meiotic spindle when an actin nucleator, CYK-1, was depleted, and similarly when NMY-2, the myosin component of the embryonic actomyosin network, was disrupted. In the future, we plan to observe the role of yolk in sperm positioning by conducting similar experiments in the mutant rme-2, which is deficient in egg yolk.

Intellectual Disability Risk in Children Born to Women with Perinatal Psychiatric Diagnoses

Alexis N. Marks-Hicks
Sponsor: Cheryl K. Walker, M.D.
Obstetrics & Gynecology
School of Medicine

Studies suggest that up to 20% of women suffer from a psychological disorder during pregnancy. There is evidence that psychiatric disorders are more common in mothers of children with intellectual disability (ID), however, few have assessed maternal mental health while pregnant and the possible effect on a fetus. We investigated the extent to which maternal psychiatric diagnoses during pre- and peri-natal hospitalizations were associated with offspring ID in a socio-demographically diverse 18-year statewide birth cohort. We linked hospital discharge records for 8,951,763 California singleton births with neurodevelopmental diagnostic records from the Department of Developmental Services (DDS) for 53,000 children with ID. Children with ID were similar to those in other studies, with inflated risk for males, older parents, lower maternal education and Black race. In adjusted analysis, mothers diagnosed with any psychiatric condition during pregnancy–mood and anxiety disorders as well as schizophrenia–were 73% more likely compared to women without psychiatric conditions to have child diagnosed with ID, with a higher risk in women with Schizophrenia. These results highlight the need for targeted developmental monitoring of children born to women with psychiatric conditions to detect early signs of ID and implement early intervention.

Spontaneous Trait Transference: People Describing Others' Traits Affects Perceptions of Communicators

Rebecca Marshall
Sponsor: Ross A. Thompson, Ph.D.
Psychology

Spontaneous trait transference is where communicators become associated with traits they describe in others. An example would be if we had two people, Pam and Amy, and Pam tells Amy that someone else is friendly. Since Amy heard Pam describe someone as friendly, Amy then thinks that Pam is friendly. We wanted to see if Spontaneous Trait Transference occurs when participants hear a story about a fictional person read by a research assistant. We hypothesized that hearing a story differing in positive or negative traits described for the character would cause participants to transfer those same traits to the assistant reading the story. One-hundred forty-three participants heard positive (Positive Condition) or negative (Negative Condition) stories about a fictional character read by an assistant. To see if participants associated the traits from the story with the assistant, they rated their perception of the assistant's personality. In the Positive Condition, participants associated the assistant with positive traits. In the Negative Condition, the story did not make a difference in how participants rated the assistant's personality. Our findings suggest a possible social desirability bias affected the Negative Condition. Had we used indirect questioning, the social desirability bias may have been reduced.

Artifactual Analyses From CA-LAK-1053: A Prehistoric Hideaway Site in the Mendocino National Forest, California

Shane M. Martin
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

This new study examines data derived from a 2015 UC Davis Archaeological Field School survey of site CA-LAK-1053 in the Mendocino National Forest. Artifacts analyzed include lithic debitage, fire-affected rock, formal groundstone tools, and diagnostic projectile points. Obsidian Hydration and X-Ray Fluorescence were conducted to assess site chronology and to source obsidian artifacts. Temporally diagnostic chert projectile points were fit into a regional chronology to compare with Obsidian Hydration results. The diversity of data recovered indicate that Native Americans used this site as a hide-away camp. Artifacts recovered include "Gunther" and "Rattlesnake" projectile points along with two pestles which display manufacturing techniques. Data recovered during survey in synthesis with information provided by Lake County's earliest historian contribute to highlighting CA-LAK-1053 as a unique and important site in North American history.Our investigation provides important information regarding chronology, site function, and modern erosional impacts that threaten this unique and prehistoric site.

CLI in Spanish-Speaking Learners of English as a Foreign Language: Cross-Sectional Analysis of an Oral Production Corpus

Beatriz Martin-Gascon
Sponsor: Claudia H. Sanchez-Gutierrez, Ph.D.
Spanish & Portuguese

Oral production in English as a foreign language (EFL) is influenced by the first language (L1) of the speakers. This cross-linguistic influence (CLI) or transfer can be evidenced by the use of cognates (i.e. association/*asociación*), false friends (i.e. pretend/*pretender*), or code-switching instances (i.e. My mother is very *simpática*). However, little is known about the individual and contextual variables that favor their usage. The aim of the present study is, therefore, to observe the differential effect of a series of predictive variables, such as age of first exposure to English, time spent abroad, years of English academic experience, and vocabulary size, among others. More concretely, we transcribe and assemble a corpus of oral narratives produced in English by fifteen Spanish speakers with different linguistic backgrounds in EFL. For each oral text, we calculate the number of cognates, false friends and code-switching instances. As information about the linguistic profile of the subjects has been previously collected, we enter these data as factors for a linear regression analysis and figure out which of those play a major role in the production of CLI instances. The pedagogical implications of these results will be discussed.

Centering Indigenous Science and Community in Klamath River Ecosystem Restoration and Management

Deniss J. Martinez
Sponsor: Elisabeth Middleton, Ph.D.
Native American Studies

As ecologists spend more time talking to the tribal communities in which they work, they are finding that Indigenous Science and active management can help increase environmental diversity. The Karuk Tribe is one exemplary model of how collaborative work with non-Indian researchers and tribal members can help advance a project. The Tribe's current project focuses on invigorating cultural food, medicine, and crafting plants. Currently a research team comprised of UC-Davis researchers and Karuk tribal member practitioners is collecting data on culturally important plant and animal species in order to assess how the reintroduction of the cultural practice of burning and thinning affects these species. They are doing this under two collaborative efforts that bring together researchers, USFS managers, Karuk traditional practitioners, and the local rural community: the Western Klamath Restoration Partnership and the Karuk/Berkeley Food Security Collaborative. This data will help the Tribe and research team develop a management plan. Cultural plants and animals are vital to Karuk tradition. Because of this; this project is not merely a conservation project; it is also an effort to ensure the continuance of a culture for future generations of Karuk tribal members.

The Role of Saliency in Young Infants' Visual Working Memory

Marisa L. Martinez
Sponsor: Lisa M. Oakes, Ph.D.
Psychology

Humans must rapidly encode and hold information between saccades to achieve a stable representation of the visual world. However, this is difficult for young infants. When shown arrays containing more than one object, young infants fail to encode the properties of the individual objects. We asked whether we could help infants encode and remember information about one individual item in a multiple-item array by increasing the saliency of that item. We presented 27 4-month-old infants with arrays of two differently colored squares (e.g., red and blue); one of the squares rotated, making it more salient (i.e., it should capture infants' attention). The array then disappeared and after a brief memory delay, the two squares reappeared, but remained unmoving; one item was now a different color from the original array. Under these conditions, older infants should look longer at the changed item, indicating that they remembered its color. However, our 4-month-old infants preferred to look at the item that rotated during the initial array; this increased salience did not appear to help infants encode the *color* of that item. Thus, salience may contribute to an attentional *capture* effect, but may not help young infants encode particular properties (such as color).

Time-Course of Gender Stereotyping in Auditory Sentence Comprehension

Rebecca A. Mata
Sponsor: Matthew Traxler, Ph.D.
Psychology

Previous eye tracking experiments have shown that listeners make anticipatory eye movements towards objects in a visual scene as they predict what a speaker might say next. Currently it is unknown how gender stereotypes and individual differences in gender bias may influence the listener predictions. In the current study I use this visual world paradigm to investigate the influence of a speakers' perceived gender on listeners' predictive eye movements. During the experiment participants will view a visual scene of an array of everyday objects as a speaker talks about the scene. As participants passively listen, their eye movements will be recorded to assess whether they automatically activate gender stereotypes. For example, while listening to the sentence, "I'm looking in the bathroom for…" will listeners automatically use the speaker's gender (e.g. female) to guide their eye-movements toward gendered objects in the scene (e.g. lipstick). The visual stimuli used in this experiment have been normed on a 7-point likert scale to assess their respective masculinity and femininity. I plan on measuring and analyzing individual differences in explicit and implicit gender bias. I predict a positive correction between gender bias and anticipatory eye movements towards the stereotypical gendered objects.

Phosphoproteomic Profiling Reveals Regulatory Proteins Involved in Plant Immune Responses

Daniel M. Matuszak
Sponsor: Gitta Coaker, Ph.D.
Plant Pathology

Plants rely on an immune system to activate a response to stop pathogen entry upon detection. Molecules secreted by microbial pathogens are detected by intracellular receptors. Receptor activation results in immunity. Plant immune defense signaling networks have primarily been generated from gene expression and yeast-two hybrid datasets. Here we used differential phosphoproteomic profiling and protein expression analysis on *Arabidopsis thaliana* membrane fractions mounting immunity mediated by the receptor RPS2. RPS2 activates immune responses upon recognition of the bacterial pathogen *Pseudomonas syringae* secreting the AvrRpt2 protein. RPS2 localizes to the cytosolic side of the plasma membrane and indirectly detects AvrRpt2 by monitoring cleavage of the membrane-associated protein RIN4, a negative regulator of immune responses. We used transgenic *A. thaliana* plants expression AvrRpt2 under a dexamethasone-inducible promoter. In a time-course experiment we analyzed plant tissue 0-, 1- and 3-hours post dexamethasone spray. We identified differentially phosphorylated proteins during a time course experiment. Mutant plant lines in genes encoding the identified proteins are currently being investigated for immunity related phenotypes.

Influence of Telomere Length and Autophagy on Stem Cell Fate Regulation

Collin Matsumoto
Sponsor: Nirmala Hariharan, Ph.D.
Pharmacology
School of Medicine

Aging is characterized by cellular hallmarks including telomere shortening, dysfunctional protein homeostasis and stem cell exhaustion, which ultimately lead to the decline in tissue regeneration. Telomere length determines the youthfulness and replicative capacity of cells. The goal of our study is to understand how telomere length regulates the cellular fate of aged cardiac stem/progenitor cells (CPCs), via modulation of autophagy, a process of protein degradation and homeostasis. Youthful stem cells exist in a state of quiescence with the potential to proliferate in response to activation cues. However, an aged stem cell undergoes irreversible cell-cycle arrest in the form of senescence and differentiation. Our data demonstrates that CPCs with short telomeres exhibit slower proliferation rates and reduced expression of quiescence markers, coincident with increased senescence and lineage commitment marker expression. Interestingly, short telomeres activate autophagy flux, suggesting a role for telomere length and autophagy in regulating the fate of CPCs. The altered fate of CPCs, including tipping the balance away from quiescence and proliferation to differentiation and senescence, contributes to the decline in cardiac regeneration with age. Our results will aid in understanding cell-intrinsic mechanisms affecting cell fate sparking interest in identifying applications to rejuvenate aged CPCs.

Mapping Genes Controlling the Level of Cytoplasmic Incompatibility in *Drosophila melanogaster*

Catherine C. Mayo
Sponsor: Michael Turelli, Ph.D.
Evolution & Ecology

The maternally transmitted endosymbiotic bacterium, *Wolbachia*, causes cytoplasmic incompatibility in *Drosophila melanogaster*, where crosses between young infected males (1-2 days old) and uninfected females produce lower egg hatch rates than the reciprocal cross. Reynolds and Hoffmann (2002) discovered significantly higher levels of CI in an Australian line compared to the laboratory stock, Canton S. They concluded the difference in CI intensity was due to variation in the host genome. Given the Reynolds and Hoffmann (2002) data, we hypothesize that the high CI of the Australian line was due to at least one autosomal dominant allele. This project aims to test this hypothesis and to map the gene(s) controlling CI intensity. We will first confirm variation in CI levels across infected *D. melanogaster* lines, and then cross high-CI and low-CI lines to create reciprocal F1 stocks. F1 males will be reciprocally crossed to uninfected females, and if high CI persists (as seen by Reynolds and Hoffmann 2002), we will use deficiency mapping to locate the autosomal allele(s) involved. If high-CI does not display autosomal dominance, further analysis of F1 crosses—and backcrosses—will determine the relative contributions of host and *Wolbachia* genetic variation to differences in CI.

Effects of Bovine Milk Fat Globule Membrane Supplementation on Cognitive Development in Rats

Shasta McMillen
Sponsor: Bo Lonnerdal, Ph.D.
Nutrition

Milk fat globule membranes (MFGM) are biopolymers found in milk fat. MFGM consists of triglycerides, proteins, glycoproteins, and membrane lipids, and are lipid droplets secreted from mammary gland secretory cell membranes. Little is known of MFGM functions, but research has implied numerous health benefits. Infant health studies have shown that breast-fed babies develop stronger cognition than formula-fed counterparts. In a recent clinical trial, MFGM was added to infant formula. This formula significantly lessened differences in cognitive development between breast-fed and formula-fed infants, and decreased infections. With these findings in mind, this study used a normal/restrictive growth model, along with a non-fat milk (NFM) control to test effects of MGFM supplementation on rat cognition. Rats were supplemented from postnatal (PD) day 2 until weaning (PD21) then challenged with T-maze and passive avoidance tests to detect cognitive differences between MFGM and NFM supplemented groups. Preliminary results in T-maze suggest benefits, though further cognitive test data are being procured. Brain tissues will be collected to access protein expression of brain-derived neurotrophic factor (BDNF) as representation of neural development. It's possible that including MFGM would mean a major improvement in infant formula, further narrowing the health gap between breast-fed and formula-fed infants.

The Use of Replicative Studies in Understanding Material Selection Strategies for Fishhook Production on San Nicolas Island, CA

Patricia J. McNeill
Sponsor: Nicolas Zwyns, Ph.D.
Anthropology

Single piece shell fish hooks revolutionized the late Holocene fishery of coastal and insular Southern California. Over the past 30 years of archaeological research on the Channel Islands it has been noted that assemblages from the northern islands are dominated by hooks produced from California mussel, while assemblages from the southern islands are dominated by hooks made from red abalone. Conventional approaches aimed at addressing these differences typically site cultural preferences, ecology, and resource depression to explain this variation. Sea surface temperature data indicate differences in innertidal and subtidal productivity between the northern and southern islands which may help explain why red abalone hooks appear less frequently on the northern chain. However, California mussel is vastly more abundant than red abalone on the northern and southern chain of the Channel Islands and previous research fails to adequately explain the relative dearth of mussel fishhooks on the southern islands, especially San Nicolas Island. This poster uses a technological approach and experimentally derived data to further address why Chumash and Gabrielino craftspeople produced fishhooks from disparate shellfish species. Special attention is paid to methods of production, efficiency, and lithic raw material constraints.

Reconstitution of Fluorescently Labeled Human Chromatin *In Vitro*

Jeanette Mei
Sponsor: Stephen C. Kowalczykowski, Ph.D.
Microbiology & Molecular Genetics

A nucleosome is DNA wrapped around histone proteins. Long fibers of these DNA-wrapped nucleosomes compose chromatin, and the modification of chromatin is the basis of epigenetics that regulates cellular processes. A variant of the canonical histone protein H2A called H2A.Z was found to be associated with nucleosome stability as well as to be a hallmark of breast cancer aggressiveness, correlating with decreased patient survival. My goal is to create recombinant chromatin that can be fluorescently labeled via covalent cross-linking onto introduced cysteine residues. I have mutated human histone proteins using site-directed mutagenesis. The expressed and purified H2B and H4 proteins contain modifications that will allow them to be covalently attached to donor and acceptor fluorescent dyes. This technique has only been performed before in *Xenopus*, but never in human. The labeled recombinant chromatin will then be further used in a study of chromatin remodeling in the Kowalczykowski lab to analyze the effects of H2A.Z histone on H2A.Z-H2B chromatin remodeling using single molecule microscopy. The purpose of this study is to understand the mechanism of chromatin remodeling in the context of future breast cancer research as a potential drug study target.

Does the Temporal Window Between Moment of Intent and Motor Output Have a Function?

Camille Mejia
Sponsor: Eve Isham, Ph.D.
Psychology

In a hallmark study, Libet and colleagues(1982) asked participants to perform a simple wrist flexion and report the moment of intent to do so. They observed that the subjective moment of decision to act (D) preceded the moment of voluntary action (A) by 200 milliseconds. Libet proposed this was a grace period in case one wished to veto the already-in-progress motor act, and therefore an opportunity to exercise free will. However, this theory needs further examination because the task used by Libet bares few resemblance to the kinds of deliberative processing that are signatures of free will. In the current study, participants performed a moral decision making task and, like Libet et al., reported the time D, along with the evaluation of how difficult the decision was. If Libet's hypothesis were correct, that the temporal window was to veto motor execution, then this time period should be the same for all trials. However, we observed that the D-A window varied according to the difficulty ratings; counterintuitively, the D-A window for easy decisions was longer than difficult ones. The results challenge Libet's hypothesis, suggesting an alternative hypothesis that the D-A window is a period of deliberation for easy, reflexive like decisions.

Teachers' Language Attitudes Toward African American English in California Public Schools

Zion A. Mengesha
Sponsor: Robert Bayley, Ph.D.
Linguistics

African American Vernacular English (AAVE) has been extensively studied since the 1960's, but questions about dialect discrimination remain. How are public school teachers reacting to AAVE in comparison to Ôstandard English'? What misperceptions about AAVE have changed, and what has stayed the same? This study investigates the way in which AAVE is perceived by thirty teachers, the impact of vernacular in American schools, and the correlation between dialect discrimination and educational outcomes at public schools in California's Bay Area. I chose these schools to control for diversity; *Canyon High School1 is a suburban school where the average cost of a home is $998,000. The student body is 35% white, 25% Asian, 20% Latino/a, and 10% African American. By contrast, *Pinewood High School is an urban school where the average cost of a home is $510,000. It has a student body that is 40% African American, 40% Asian, 21% Latino/a, and 1% white. They exemplify widening inequality and disproportional academic performance indexes. *Bay Area City College is a 2-year public institution, and a member of the California Community Colleges. Different degrees of sensitivity to AAVE emerge between the outgroup (Canyon) and the ingroup (Pinewood).

Investigating Emergence of Dioecy Morphs in *Trichostema laxum* (Lamiaceae)

Karissa L. Merritt
Sponsor: Neal M. Williams, Ph.D.
Entomology & Nematology

Novel polymorphisms in populations of *Trichostema laxum* (Lamiaceae), have been observed at McLaughlin Reserve UCNRS. These polymorphisms involve the sexual structures of the flowers, where some plants produce flowers that function more male and others more female. Preliminary evidence reveals that 'male' plant morphs are producing an average of 6,000 grains/flower, while 'female' morphs produce only 200 grains/flower. This difference in the paternal investment may result in a variance in maternal investment as a difference in seed size and weight. Our hypothesis is that higher pollen production comes as a trade-off in seed mass. We expect to see the *T. laxum* 'male' morphs producing smaller seeds than the 'female' morphs since resources are being allocated more towards pollen production instead of ovules. How will this trade-off in pollen production and seed mass affect the viability of the offspring? This research seeks to find evidence of evolutionary steps towards dioecy (different sexes among plants) in *T. laxum*.

The Effects of Transgenic Goat Milk Expressing Human Lysozyme as an Inflammatory Bowel Disease Treatment Alternative

Kimberly H. Miller
Sponsor: Elizabeth A. Maga, Ph.D.
Animal Science

Treatments for Inflammatory Bowel Disease (IBD) can have detrimental side effects. Lysozyme is a major antimicrobial protein in milk and can have the effect of promoting gut health. Transgenic goats expressing human lysozyme (hLZ) in their milk were developed; milk from these goats has the potential to be an alternative to classic IBD treatments. A prior pilot study demonstrated that dextran sodium sulfate (DSS) effectively mimics the effects of IBD in pigs. In 2015, a study commenced investigating the outcome of administering hLZ goat milk and regular goat milk as treatments for pigs administered DSS, compared to control animals. Colonic tissue exhibits small indents in the epithelial layer called crypts which can indicate levels of damage and healing. At necropsy, portions of colon tissue were collected and imbedded in paraffin blocks, sectioned, fixed and stained with hematoxylin and eosin. Crypt depth and lamina propria thickness were measured using ImageJ software. RNA was extracted and gene expression analyzed in eight target genes via qPCR techniques. While further study is required, the results from this study indicate that transgenic goats expressing human lysozyme in their milk might be a viable and less side effect-inducing alternative to classic IBD treatments.

A Successful *In Vitro* Model of an Engineered Equine Ligament

Rebecca A. Miller
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

Ligament injuries are common causes of lameness in horses, often preventing a return to competition. Further exploration of the tissue's capacity to heal and the effectiveness of current regenerative therapies is warranted. Our lab has previously generated bone-ligament-bone grafts from human ligament remnants and used them to understand physiology. To achieve this, a fibrin gel embedded with human fibroblasts is set between two calcium-phosphate anchors. The constructs form within seven days and are mechanically tested at 14 days. This study aims to develop a similar model for equine ligament constructs *in vitro*. To achieve this goal, eight different equine cell types were chosen, and cells from these tissues were embedded in the fibrin gel. Constructs from skin, adipose, and umbilical cord failed before 14d, whereas bone marrow (bMSC), muscle (MFB) and the superficial digital flexor tendon (SDFT) cells made robust constructs. Of these, the SDFT were the strongest (SDFT=0.59±0.02; MFB=0.56±0.02; bMSC=0.44±0.003 N) ligaments. We then determined that the variability in SDFT constructs among five donors was 47%. Therefore, this work describes the successful engineering of equine ligaments *in vitro* and provides a model for future advances in the field of equine regenerative medicine.

Genome Wide Association Study for Genetic Markers of Myofibrillar Myopathy in Arabian Horses

Brittni A. Ming-Whitfield
Sponsor: Carrie J. Finno, D.V.M.,Ph.D.
Population Health & Reproduction
School of Veterinary Medicine

Myofibrillar Myopathy (MFM) is a type of muscular dystrophy, primarily affecting skeletal muscle, which results in loss of muscle function or weakness across species. In the Arabian horse, MFM appears to be inherited as a simple Mendelian trait. The aim of this study is to perform a genome wide association study (GWAS) to identify single nucleotide polymorphism (SNP) markers that are significantly associated with the MFM phenotype. A second aim is to investigate this associated genomic region for putative functional variants using whole genome sequencing from 3 affected and 41 unaffected horses. A GWAS, using the Equine SNP 670 array, was performed on 48 Arabian horses phenotyped for MFM (affected= 22 horses, control=26 horses). SNPs will be statistically evaluated to determine if they have a genome wide association with the MFM phenotype after accounting for multiple testing. SNPs that achieve this level of significance will be prioritized for further investigation for genetic mutations in the region using the whole genome sequencing dataset. I hypothesize that the most significantly associated SNP markers will be near genes coding for muscle fiber development.

3D Printing Miniature Fuel Film Combustors

Marisela Miramontes
Sponsor: Derek Dunn-Rankin, Ph.D.
Mechanical & Aerospace Engineering

Small portable devices for enhanced human activity–i.e. prosthetics, personalized robots, computationally demanding electronics–require high energy. Small liquid-fueled engines represent a potential option if able to be made compact and efficient. Liquid film combustors have been shown to be capable of producing 1 thermal horsepower, but complex geometries make it difficult to machine. Manufacturing these tubes using a 3D printer allows for more designs to improve performance. Currently, 3D printers that operate using Fused Deposition Modeling (FDM) techniques are incapable of producing such parts. If printed correctly, these small tubes can use evaporative fuel cooling to withstand the combustion within. Our research is to develop a high performance FDM system to deliver a film combustor with integrated flow mixing. The first steps are to verify the FDM printer performance followed by test prints, dimensional verification, and demonstrations of novel film combustor chambers. The printing conditions are then modified to improve the quality of the printed parts. Lastly, flows using the new 3D printed air mixers are compared to those from prior designs. However, more research and analysis needs to be done on the flow mixing within the testing chamber to determine which method produces better air mixing.

Energy Affordability in the United States: Some Descriptive Statistics

Cristian Molina Cornejo
Sponsor: Bagher Modjtahedi, Ph.D.
Economics

This paper analyzes energy affordability through thorough analysis of the official data from The United States Energy Information Administration on household energy consumption. It mainly focuses on the notion of energy affordability and its difference from the more commonly studied concept of income poverty. It defines energy affordability in terms of the amount of money a household spends per unit of an energy service such as the amount of living space heated or cooled. We relate this energy service price to economic, demographic, and housing characteristics of the households studied. We find, for instance, that lower-income households pay higher energy service prices than higher-income households. We also find that renters face a higher service price than owners. Finally, we discuss possible implications of our findings for the conduct of energy policies such as: appliance subsidies for low-income households, energy efficiency, building standards, as well as policies to reduce greenhouse gases.

Structural-Functional Analysis of Plant Diterpene Metabolism

Iris N. Mollhoff
Sponsor: Philipp Zerbe, Ph.D.
Plant Biology

Diterpenes are a group of small molecule metabolites found in plants, animals, and fungi. They rank among the most diverse classes of metabolites with more than 12,000 distinct compounds. Many of these diterpenes represent valuable bioproducts, eg. pharmaceuticals, fragrances, and food additives. However, the enzymatic mechanisms that facilitate the production of diterpenes are not well understood. Diterpene synthases are the key enzymes involved in generating diterpene diversity in plants. The Zerbe lab has established an expansive collection of over 20 functionally distinct diterpene synthases from more than 15 different plant species. My research goal is to gain a deeper understanding of diterpene synthase structures, reaction mechanisms, and interactions. I will utilize protein structural modeling, protein crystallization, and *in vitro* and *in vivo* assays to investigate active site conformations and the functional plasticity of diterpene synthases. Ultimately, using these methods I am able to predict active-site amino acid residues that control product specificity and better understand at what level diterpene syntheses interact.

Poverty, Contextual Factors and Academic Attainment of Children and Youth

Shaun I. Moncada
Sponsor: Katherine J. Conger, Ph.D.
Human Ecology

Previous research has examined how socioeconomic status (SES) predicts academic achievement and has highlighted the importance of context and support, particularly for individuals in lower SES areas (e.g., Ross & Mirowsky, 2009). Further research is needed to understand how individuals with few resources persevere in school. This study examines how neighborhood, family, and social contexts shape learning and interact to affect achievement. Adolescents and young adults (N = 6979) participated as part of the NLSY Children and Young Adult Study. Results showed that individuals from a low SES neighborhood with high crime were less likely to receive parent involvement than individuals from high SES neighborhoods or areas with less crime ($\beta = .02$). Further, for individuals who have more involved parents and are experiencing less social pressures, those who are less critical (i.e., analytical) are more likely to apply to college. However, if individuals with more involved parents have more social pressure, those who are more critical are more likely to apply to college rather than individuals who are less critical ($\beta = .20$). These interactions help us to understand how despite social pressures and difficult neighborhood qualities, some students are able to persevere academically because of individual characteristics.

Under Pressure: Effects of Parental Pressure on Children's Fruit and Vegetable Consumption and the Energy Density of Their Diets

Debadrita Mondal
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

In a national survey, Ogden et al. (2015) reported 26.4% of children aged 2–11 years were obese. Parental feeding practices may be associated with child BMI. Pressure to eat, a mealtime behavior in which parents urge children to increase overall food or specifically healthy food consumption (Gregory et al., 2010), has been negatively associated with BMI in preschool- and early elementary school-aged children (Hurley et al. 2011). Articles investigating pressure to eat in association with food consumption largely only examine fruit and vegetable consumption (FVC) in preschoolers (Blisset, 2011). This study aims to explore the effect of pressure to eat on FVC relative specifically to the energy density the children consumed. We hypothesize that pressure to eat may be positively associated with FVC and negatively associated with energy density consumed. Controlling for energy density, a multiple regression model was used with pressure to eat predicting FVC. 130 parent-child pairs, all from the Head Start or WIC programs in the Sacramento area, took the My Child At Mealtime questionnaire (Ontai et al., 2010). Items on the questionnaire reflecting pressure to eat were aggregated into a scale. FVC (cups) and energy density were recorded using 24-hour dietary recall.

Correlation of Economics and Racism in the U.S. and Global Sphere

Simone Montague-Jackson
Sponsor: Corrie Decker, Ph.D.
History

Out of the Dark Ages of limited thought and into scientific innovation, the 18th century Enlightenment Era in Europe set the precedent for the modern economic, scientific and social structures in the world. Western European nations ventured on a ÒhumanitarianÓ quest to free and unburden those enslaved by barbarism and savagery in Africa, Latin America, Middle East, and Asia. During the 19th and early 20th centuries, and after the fall of colonialism, theories of race and progress emerged, thus influencing domestic U.S. policies (i.e. Jim Crow Laws) through a new phase of European expansion known as the "New Imperialism." The focus of this research entails the past and present correlation of racism and economics. This research includes analysis of social-economic concepts (i.e. Social Darwinism, scientific racism, eugenics, etc.), literature by social scientists and 20th century Black intellectuals, the U.S. prison system, and empirical analysis of my experience in Amman, Jordan. The purpose of this research is to explain the current global phenomenon of socio-economic constructs such as dark-skin representing poverty and intellectual ineptitude, while light- or white-skin denotes prosperity, astuteness, and power; however, the ultimate objective involves seeking a solution to this plaguing problem.

Effects of Plant Shading on Monarch Butterfly Caterpillars

Brendan W. Moran
Sponsor: Kara Moore, Ph.D.
Evolution & Ecology

Chemical and physical leaf traits can vary based on the plant growth environment, influencing the growth and fitness of invertebrates that feed on them. Milkweed produces cardiac glycosides and other chemicals as part of a chemical defense syndrome against herbivores. Monarch butterflies (*Danaus plexippus*) oviposit selectively on milkweed. Their larvae sequester cardiac glycosides, lending to their own defense as juveniles and adults. Plant defenses may also negatively influence larval growth. I examined the effects of Mojave milkweed (*Asclepias nyctaginifolia*) leaf traits, taken from 4 different field sites and grown in a greenhouse in sun and shade, on monarch butterfly larvae growth. This tests how shaded environment influences leaf traits and palatability to larva. Individual larvae were reared on material from each plant; weight was measured after 7 days. Non-parametric analyses were used to evaluate differences in caterpillar weight due to shade treatment and seed source. Variation in leaf traits across sun and shade treatment and sites, and their correlation with larval weight, was explored. Research is being done to see if increasing project scale would be worthwhile, and future projects have been planned to determine the cardiac glycoside content of the milkweed plants used in this experiment.

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Cameron K. Mosier
Sponsor: Nolan Zane, Ph.D.
Psychology

There are disparities among those who seek mental health treatment and those who stay in treatment. Research has shown that Asian-Americans, males, and those of a lower socioeconomic background are reluctant to seek out mental health treatment and are more likely to prematurely terminate treatment. Although traditional psychotherapy may benefit many individuals, certain groups may not find psychotherapy to be appealing them particularly if they are less comfortable or less willing to self-disclose personal distress. The current study examines group differences in self-disclosure, a key aspect in successful psychotherapy, among Asian-American and Caucasian college students (N=366). Our results indicated that Asians, males, and those of lower socioeconomic status were less likely to disclose information to a friend or to disclose distress than Whites, females, and those of higher socioeconomic status, respectively. These results suggest that those less likely to self-disclose may benefit less from traditional psychotherapy. Mental health professionals should work with their clients to develop more culturally valid therapy treatment plans.

Water Quality Issues During Drought Using Fish Model Medaka, *Oryzias latipes*, in the San Francisco Delta

Allyson R. Mulcahy
Sponsor: Tomofumi Kurobe, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Deterioration of water quality has been a major concern on the protection of aquatic environments as well as the public health in the San Francisco Delta. Concentrations of contaminants, such as pesticides, which originated from agricultural activities, are increasing due to the significantly low freshwater inflow. In addition, elevation of water temperature promotes intense blooms of harmful blue-green algae that produce algal toxins. Despite its importance, our understanding of the impacts of the drought on aquatic environments is still very limited. To address the issue, we performed fish embryo toxicity testing using a fish model, Medaka, *Oryzias latipes*. The surface water samples were collected from ten sampling stations in the San Francisco Delta throughout the summer and fall of 2015, and were used for our toxicity testing. Our preliminary results indicate that the fish embryos incubated in the surface water exhibited mortalities and a characteristic developmental deformity. In our presentation, we will discuss possible cause(s) of the mortality and deformity, and the potential impacts on the aquatic environment and public health.

CDK9 Inhibitor Shown to Effectively Decrease HIV Latency Reactivation

Biftu Mume
Sponsor: Guochun Jiang, Ph.D.
Medical Microbiology & Immunology
School of Medicine

The Human Immunodeficiency Virus (HIV) is a retrovirus that over a million people in the U.S. suffers from. Early in the course of infection, HIV establishes latent reservoirs in CD4 T-cells. These reservoirs can then be reactivated when P-TEFbs (CDK9 and cyclin T1) binds to the RNA stem loop structure, promoting transcription of viral genes. I hypothesize that a CDK9 inhibitor, "compound X", can shut off HIV latency reactivation, which may be developed as a novel strategy to suppress latent HIV expression into permanent latency. To test this *in vitro*, I utilized J Lat cells, which are HIV latently infected cells with low HIV gene expression. I treated the cells with a) compound X alone; b) JQ1, a CDK9 activator, alone; and c) JQ1 and compound X, together. Through PCR analysis, JQ1 was shown to up-regulate the relative HIV reactivation 14 fold, while cell samples co-treated with compound X and JQ1 had reduced HIV gene expression more than 50% when compared to those treated with only JQ1. Cells treated with compound X alone had decreased relative HIV reactivation. This data supports our idea that further suppressing latent HIV is achievable, which could be a new tool to fight HIV latency.

Factors and Psychosocial Barriers Affecting Engagement of African American Men in Prostate Cancer Care and Prevention and Strategies for Intervention

Chinedum U. Muo
Sponsor: Lorena Garcia, MPH, DrPH.
Public Health Sciences
School of Medicine

Prostate cancer, the second-leading cause of cancer-related death in U.S. men, is evidenced most in African American men at alarming rates. Although the past decade has witnessed both incidence and mortality rates decrease and five-year survival rates increase for African American men afflicted with prostate cancer, it continues to disproportionately affect African American men, displaying the highest prostate cancer incidence and death rates when compared to other ethnic groups. Several factors may contribute to the disparity. A systematic examination of the literature was performed, using several key terms and themes to evaluate and understand how factors, attitudes and behaviors concerning prostate cancer related healthcare influence African-American men's engagement in preventative care and prostate cancer knowledge and/or treatment options with healthcare providers. The initial search criteria generated 1010 studies from studies published starting 1994 through June 2015. A refined assessment delivered seventeen studies that met all inclusion criteria. Access to health screenings for earlier detection, health literacy in prostate cancer, and deprived patient-provider communication proved to be obstacles to engagement. Community education, interventions involving community leaders and family members, and open, informed decision making among providers and their patients should be considered in an attempt to alleviate this disparity.

International Trade: A Case of Growing Economic Interdependence

Cynthia Murillo
Sponsor: Janine L. Flathmann Wilson, Ph.D.
Economics

Since its implementation in 1994, the North American Free Trade Agreement (NAFTA) has been an increasingly relevant topic in terms of economic research on international trade. Extensive data analysis has been conducted to determine the economic and welfare effects it has had on the participating countries and the rest of the world. Because a change in policy that affects prices has indirect effects on the rest of the economy, free trade agreements continue to be important factors in the growing economic interdependence among countries. This project is motivated by the concern of understanding how the Trans-Pacific Partnership (TPP), a trade deal that comprises approximately 40% of the total world population and about 50% of the total world GDP, will affect its 12 members and the rest of the world. To answer this, I use a version of the gravity model of trade, where components such as distance and GDP magnitude help predict bilateral trade flows. Through analysis of data from 2005, calculations of a log-linear model, and literature review, I seek to predict how the TPP will affect global trade and define political relationships affecting the global economy.

Infant Sanitation in Developing Economies of South and Southeast Asia: Current Conditions and Potential Solutions

Sanjana S. Naik
Sponsor: Koen K. Van Rompay, D.V.M.,Ph.D.
Primate Center

Diarrhoeal diseases are a leading cause of mortality and morbidity, especially among young children in low-income countries, and are associated with exposure to human excreta. Despite this, a dearth of information surrounding child sanitation behavior exists within the body of recent academic scholarship. A systematic review of children's sanitation practices found that non-hygienic feces disposal increased the risk of diarrheal disease by 23%1. For this reason, our team conducted an academic review of several peer-reviewed academic studies to determine (1) the prevailing practices of child waste disposal and their impact on health outcomes in developing economies and (2) what hardware solutions and behavioral interventions– if any– are successful in bringing about positive behavioral change. We would like to analyze the efficacy of existing solutions including reusable diapers, child-friendly potties, potential latrine seats offering child safety, and programs under the Total Sanitation Campaign (TSC). The implications of the research ultimately help determine the appropriate method for child sanitation in the regions of South and Southeast Asia.

Variation in Maternal mRNA Deposition in *Drosophila melanogaster*

Mohan Koumar Murugesan
Sponsor: Susan E. Lott, Ph.D.
Evolution & Ecology

In all animals, the earliest stages of development are completely dependent on maternally deposited mRNAs and proteins, before the embryo is able to begin transcribing its own genome. These maternally deposited factors determine the rest of development. Despite maternal deposition being studied in model organisms, we have very little insight on its evolution. Previously in the lab, we have demonstrated that maternal deposition varies between closely related *Drosophila* species, potentially producing differences in developmental phenotypes. In this study, I investigate how much variation exists in maternal deposition within a species, which will be on a smaller evolutionary timescale than variation between different species. Here, I characterize maternal mRNA deposition in embryos from different *Drosophila melanogaster* lines, of both African and non-African origin, to maximize genetic divergence. The procedure involves RNA from individual stage 2 embryos, where all RNA transcripts are maternal, before zygotic transcription begins. Extracted RNAs are constructed into sequencing libraries and sequenced, with three replicates per line. These sequence data are analyzed to determine the changes in how much of which gene product is deposited in the fertilized egg and what types of genes change to regulate maternal deposition.

Comparative Genomics of *Fusarium oxysporum*

Melodie C. Najarro
Sponsor: Thomas R. Gordon, Ph.D.
Plant Pathology

Fusuarium oxysporum is a major pathogen of many important crops. In previous research, the genomic sequence for *Fusarium oxysporum* f sp. *lycopersici* 4287 (Fol-4287) revealed large segments of repetitive sequences and genes related to pathogenicity not found in closely related species (Ma et al., 2010). It is now believed that these regions, referred to as accessory genomic regions, are not critical to survival, but do contain transposons and rapidly evolving genes related to each individual's pathogenicity and crop specificity. Interestingly, the accessory genome of Fol-4287 was not found in a different strain of *Fusarium oxysporum* that is pathogenic to strawberry (Fof). However, Fof had approximately 10Mb that also were not found in the genome of Fol-4287 and were also enriched with transposons and pathogenicity-related genes. Our team will compare the accessory genomic regions of Fol-4287 to the ~10Mb from the genome of Fof that is not found in Fol-4287. To do this, we will identify and align protein coding sequences from these putatively accessory regions and use them to create phylogenetic trees. We hypothesize that protein coding sequences from these regions will be more closely related within the species than to those found in other, closely related species.

Determining RNAi Efficacy in *Caenorhabditis* Species

Taylor Nakayama
Sponsor: JoAnne Engebrecht, Ph.D.
Molecular & Cellular Biology

RNAi (RNA inactivation) emerged as a leading genetic analysis tool for *Caenorhabditis* research due to its specificity in post-transcriptional silencing of targeted genes. The most common method to introduce exogenous dsRNA (double-stranded RNA) hinges upon two genes: *sid-2* (uptake of dsRNA into cells) and *sid-1* (dissemination of dsRNA signal). While *C. elegans* is proficient for both- most of its relatives, *C. briggsae* and *C. remanei* for example, encode divergent, non-functional forms of *sid-2*. This inability to respond to environmental RNAi poses a considerable challenge to orchestrating reverse genetic experiments. Given the untapped potential of these species, RNAi-sensitive *C.briggsae* and *C.remanei* strains were generated using *Cel-sid-2* transgenesis. Here I seek to confirm the RNAi-sensitivity/efficacy of these strains by examining their response to species-specific dsRNA. *Cbr-chk-1* (DNA replication checkpoint) and *Cre-unc-22* (locomotion/coordination) RNAi constructs were generated via Gibson and transformed into specialized *E.coli* feeding strains to administer to the RNAi-sensitive *C.briggsae* and *C.remanei* strains, respectively. Antibody staining and morphological analysis will be used to visualize/quantify the percentage of successful gene silencing. These findings will provide a baseline for the RNAi-sensitive strains, allowing for accurate interpretation in subsequent RNAi-based research across the *Caenorhabditis* genus.

How Does an Unhealthy Diet Associate to School Performance in a Sample of Children From Ages 5 to 8 Years in California Central Valley?

Maria G. Navarro Nunez
Sponsor: Banafsheh Sadeghi, M.D.,Ph.D.
Internal Medicine
School of Medicine

Childhood obesity has become a global epidemic affecting the well- being of many children. Various health problems arise with obesity but understanding how it affects the cognitive ability of school children is just as important. The purpose of this research is to understand if there is any association between childhood obesity and academic performance in Mexican-origin children between the ages of 6 to 8 years residing in California's Central Valley. We hypothesize that school children with poor diet habits will have significantly lower scores when compared with children with healthier diets. To test our hypothesis we will use the BMI data from the Ninos Sanos, Famila Sana (NSFS) study and standardized scores from the school districts. We will run correlation and student-t-test to explore any associations between obesity and school performance. The results will be used to design targeted interventions to improve children's' health status as well as school performance.

The Influence of Soil Phosphorus on Root Traits in a Tropical Ecosystem

Abbey S. Neat
Sponsor: Marcel Holyoak, Ph.D.
Environmental Science & Policy

In lowland tropical forests, phosphorus is a major limiting soil nutrient. Low phosphorus levels induce stressful conditions, potentially making it necessary for trees to adapt or evolve to better suit the environment. Fine roots (diameter less than 1-2 mm) and mycorrhizal associations are two belowground mechanisms to assist trees with soil nutrient acquisition. The goal of this investigation was to observe how morphological tree investment strategies vary across different levels of soil phosphorus. The study, conducted in the tropical forests of the Panama Canal Zone, revealed that the total fine root production is inversely correlated to levels of soil phosphorus. In addition, mycorrhizal colonization at areas of high phosphorus was significantly lower than at sites with medium and low levels of phosphorus. These findings indicate that tropical trees invest more resources in root production and fungal associations when soil nutrients are difficult to acquire. More broadly, the study implies that environmental changes influence tree morphological investment. Future variations in the global climate may also initiate changes in root allocation. This could impact tropical nutrient cycling, and potentially redefine the role of the tropics as a carbon storage unit.

Behavioral and Immunohistochemical Characterization of an Inducible Mouse Model of Fragile X-Associated Tremor/Ataxia Syndrome (FXTAS)

Ekaterina N. Neverova
Sponsor: Robert F. Berman, Ph.D.
Neurological Surgery
School of Medicine

Fragile X-associated tremor/ataxia syndrome (FXTAS) is a neurodegenerative movement disorder resulting from an expansion of a CGG trinucleotide sequence (55-200 repeats) in the 5'-untranslated region of the *FMR1* gene. In FXTAS, there are increased levels of Fmr1 mRNA and decreased expression of FMRP, an important protein for neurodevelopment. FXTAS is characterized by progressive development of intention tremor, ataxia, and neuropsychological problems. To examine the role of CGG expansion in FXTAS pathogenesis, we have developed a new mouse model that ectopically expresses a CGG(90) repeat specifically in neurons, induced by doxycycline. Immunohistochemical and fluorescent microscopy techniques were used to confirm CGG(90) expression in neurons as well as the presence of intranuclear inclusions, a hallmark of pathology in FXTAS. To characterize their endophenotypes, these inducible-mice were screened using a battery of behavioral assays. Motor coordination was assessed using a Ladder Rung task, gait analysis and Rotarod testing. Additionally, locomotor activity, anxiety and social interactions were measured using the open field, Elevated Plus Maze, and a three-chamber social interaction paradigm, respectively. Results from this study will shed light on the underlying neuronal-specific role of CGG repeat expansions in the pathogenesis of FXTAS.

Early Competence to Thyroid Hormone Signaling in *Xenopus laevis*

Tammy H. Ng
Sponsor: J. David Furlow, Ph.D.
Neurobiology, Physiology & Behavior

The thyroid hormone signaling pathway serves as an essential regulator for numerous physiological processes including neural development, cardiac output, basal metabolism, and osteogenesis, among others. Disruptions to the thyroid hormone signaling pathway thus have severe biological consequences. Thyroid hormone induces complete metamorphosis in *Xenopus laevis*, commonly known as the South African clawed frog, making it an excellent model for studying the effects of endocrine disruption. The stages of metamorphosis in *X. laevis* correspond to distinct morphological phenotypes. In scientific literature, in vivo experiments on endocrine signaling have conventionally been delayed until *X. laevis* tadpoles have reached approximately two weeks of development, at which the tadpoles respond to thyroid hormone signaling with visible changes in morphology. However, we found that metamorphic responses observed in early treatment of *X. laevis* tadpoles with varying concentrations of natural thyroid hormones (T3 and T4) indicate that many tissues are competent to respond to thyroid hormone as early as stage 41, only three days after fertilization. These results have important implications for studies on developmental endocrine signaling, suggesting that in vivo screening of chemicals that affect thyroid hormone signaling pathways can be performed at much earlier stages.

Novel *In Vivo* Screening Method of OBOC Combinatorial Libraries in Living Mouse for Discovery and Development of Clinically Relevant Anti-Cancer Agents

Alan T. Nguyen
Sponsor: Kit S. Lam, M.D.,Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

One-bead-one-compound (OBOC) combinatorial library method enables synthesis and concurrent screening of millions of random compounds, such that each bead displays a unique compound. These libraries have always been screened *in vitro* for biological functions, such as cancer cell death. However, *in vitro* testing often does not reflect what happens in vivo. National Cancer Institute developed *in vivo* hollow fiber assays to increase throughput of *in vivo* drug testing. Multiple hollow fibers, each containing one cancer cell line per fiber, are implanted intra-peritoneally or subcutaneously into mice prior to drug administration. Hollow fiber pores retain cancer cells while permitting entry of host growth factors and nutrients. We will develop a novel *in vivo* method to screen OBOC combinatorial libraries for anti-cancer activity. We will fabricate PDMS microwell cassettes to immobilize OBOC beads with cancer cells embedded in artificial-3D-gel matrix, containing integrin-ligands to simulate *in vivo* conditions, before insertion inside hollow fiber. Compounds from beads are released on demand by intraperitoneal injection of reducing agents. Anti-cancer activity of individual compound-bead will be detected with tetrazolium dye, staining only live cells. We believe this proposed novel screening method will yield high quality lead compounds for the development of clinically relevant anti-cancer agents.

Differential Gene Expression of *Solanum* Species – Bioinformatics Project

An Nguyen
Sponsor: Siobhan M. Brady, Ph.D.
Plant Biology

Studying *Solanum pennellii*, *Solanum lycopersicum*'s (domesticated tomato) wild relative with greater stress tolerance including salt and drought response, may allow us to improve the domesticated tomato. I am investigating expression levels of genes in early development of both species which would help us understand differences between the two species. Biological pathways of interest are suberin in roots and cuticular waxes in shoots which are both associated with water loss prevention. After mRNA from root and shoot tissues in both species at days 6, 9, and 12 was extracted, RNASeq libraries were prepared. Differential gene expression (DGE) analysis was accomplished using EdgeR. Preliminary results showed increased DGE between species for root tissues over time. The number of differentially expressed genes in shoot tissues between species decreased at day 9, but increased again at day 12. Ongoing analysis includes Gene Ontology enrichment testing which categorizes known sets of genes involved in suberin and cuticular wax biosynthesis. Clustering analysis, using K-means and hierarchical methods, will be used to group genes changing similarly across time, tissue types, and species. Biological validation will be done using histology. The results will allow me to draw conclusions about the genes associated with suberin and cuticular wax production.

Rescuing Expression of an Epilepsy Gene: Activating *SCN1A* Expression in Human Cells Using dCas9-p300 in SH-SY5Y Cell Line

Anh Nguyen
Sponsor: Alex Nord, Ph.D.
Neurobiology, Physiology & Behavior

Epilepsy is a neurological disorder that results from abnormal electrical activity within the brain. Severe genetic forms of epilepsy are associated with mutations in the *SCN1A* gene, which result in a loss of production of the alpha subunit of sodium channels. A possible gene therapy pathway involves the use of synthetic transcriptional activators to increase expression of the remaining functional *SCN1A* allele. Derived CRISPR/Cas9 chimeric protein constructs can target specific regulatory DNA sequences and activate gene expression. This study's purpose is to increase *SCN1A* gene expression in the human HEK 293 kidney and SHSY-5Y neuroblastoma cell line as a proof-of-principle for rescuing expression via targeting a brain-specific *SCN1A* promoter. To test this hypothesis, synthesized guide RNA and dCas9 p300 were cloned in bacterial cells. After preparation, both vectors were transfected into human HEK 293 and SHSY-5Y cell lines. Quantitative (q)PCR was used to measure levels of *SCN1A* expression in the human HEK 293 and SH-SY5Y cell lines. Preliminary data suggested an increase in *SCN1A* transcription and success using a validated targeting construct for globin genes. The long-term goal is to develop this method as a treatment for *SCN1A*-associated disorders.

Developing a Bacterial Isolate Collection From the Rice Root Microbiome

Bao Nguyen
Sponsor: Venkatesan Sundaresan, Ph.D.
Plant Biology

Plant root-associated bacterial communities exert beneficial effects on their hosts, such as promoting general growth, converting essential nutrients into available forms, and conferring resistance to both biotic and abiotic stresses. Because of the many potential applications in agriculture, researchers aim to better understand the interactions of these microbial communities with crop plants. In order to accomplish this goal, it is useful to generate a collection of bacterial strains isolated from plant tissues. For this project, we used traditional culturing techniques to isolate microbes inhabiting the roots of rice plants grown in different soils. Sanger sequencing of full length 16S rRNA genes was used to identify the cultured strains. Simultaneously, we generated 16S rDNA libraries from total DNA extracted from the same rice roots used for microbe isolation. These libraries were sequenced using the Illumina platform to evaluate the abundance of the cultured strains in the root-associated microbial communities. The bacterial isolates collected and characterized in this project represent a valuable resource for future experimental approaches to understand the function of native microbial communities in rice.

PKC Agonists Increase HIV Reactivation From Latency Through the PKC-NF-kappaB, PKC-TEFb, and PKC-SP1 Signaling Pathways

Don T. Nguyen
Sponsor: Guochun Jiang, Ph.D.
Medical Microbiology & Immunology
School of Medicine

The development of anti-retroviral therapy (ART) has saved millions of lives by successfully targeting and reducing HIV viral load in patients, but there is currently no cure for this disease due to HIV's ability to establish dormant reservoirs in host immune cells. The "shock-and-kill" strategy is proposed to target latency by using latency reversing agents (LRAs), which induce reactivation of these reservoirs, allowing ART and immunotherapy to eradicate them. Protein Kinase C (PKC) agonists are known LRAs that can potently reactivate HIV from latency. However, the underlying mechanism for their potency is unclear. In this study, I am investigating whether a newly identified PKC agonist, Ingenol, modulates multiple signaling pathways that are already known to control HIV transcription. My hypothesis is that Ingenol is able to reactivate latent HIV through multiple pathways, including PKC/NF-kB, PKC/p-TEFb (CDK9/CycT1), and PKC/Sp1 signaling. If this were the case, it would explain why Ingenol is so potent at HIV latency reactivation compared to other LRAs as indicated by results of previous experiments conducted in our lab.

Molecular Cloning of Bacteria From the Gut Microbiota

Henry Nguyen
Sponsor: Andreas Baumler, Ph.D.
Medical Microbiology & Immunology
School of Medicine

The human gut biome contributes to host defenses, metabolism and immune development. Studies show that there is an association between the lack of *Clostridia* (the dominating member by abundance) and varying health conditions such as colitis. However, *Clostridia* species of the human gut have been understudied due to the lack of molecular biological tools and there is insufficient evidence on their role during health and disease. Recently, a set of plasmids have been developed that work with model clostridial organisms and these may enable us to start studying more biologically relevant bacteria. My aim is to introduce these plasmids into *Clostridia* isolates as a first step to facilitate gene knockouts. Since *Clostridia* grow under anaerobic conditions, we were able to test which antibiotic resistance genes work to use as suitable markers to identify plasmid uptake. Also, we were able to introduce an additional antibiotic resistance marker as a secondary means of selection. Currently, we are pioneering methods of transformation, which includes conjugation transfer with *E. coli*. This will enable us with a new research tool that can contribute to our understanding of the role of Clostridia in the human gut microbiota. *Clostridia*

Episodic Memory for Emotion Words

Kateri T. Nguyen
Sponsor: Beth A. Ober, Ph.D.
Human Ecology

It has been hypothesized that native speakers show a larger cognitive advantage than non-native speakers for positive compared to negative emotionally laden words (Kazanas & Altarriba, 2015). In our study, two groups of bilingual subjects will be given a verbal episodic memory task using a list of 24 emotion-laden words: 12 positive and 12 negative valence words, which will be used for the duration of three trials to test this hypothesis. The memory test consists of an oral presentation of the stimuli followed by immediate, short, and long delay recall trials, along with a succinct verbal recognition test at the end. The participants must satisfy the following requirements: non-native English speakers must have learned the language (English) after the age of 12; native English speakers who must have learned a second language, but only after the age of 12. Apropos to the findings, hopefully it will yield sufficient data to draw a palpable correlation between bilingualism and emotionally-laden words.

The Effects of Vasopressin on Stress Expression in Prairie Voles (*Microtus ochrogaster*)

Kenny T. Nguyen
Sponsor: Adele M. Seelke, Ph.D.
Psychology

Arginine vasopressin (AVP) is a hormone that is a key regulator of complex behaviors. Its clinical use has implications that are far reaching as it has emerged as a target for treating autism spectrum disorders (ASD), which is characterized by dysfunction of hormonal systems. However, the effects of AVP on the brain and behavior during critical developmental periods are understudied. To investigate these effects, we observed the locomotor activity of prairie voles (*Microtus ochrogaster*) treated with some dosage of AVP or with saline control. Specifically, we observed their activity in two behavioral paradigms, the open field test (OFT) and novel object recognition test. We looked closely at line crossing and freezing behavior, which are variations in stress expression. The purpose of this study is to explore behavioral variations in stress expression and to determine if intranasal administration of vasopressin (INAVP) affects these mechanisms differently. By comparing line crossing and freezing behavior, we are showing that vasopressin may be changing how the animals cope with stress. We hypothesized that stress coping mechanisms are affected by alterations to the INVAP system, and that the line crossing and freezing behavior are not related to each other.

Embryonic Stem Cell Differentiation Into Retinal Ganglion Cells

Laura H. Nguyen
Sponsor: Anna La Torre, Ph.D.
Cell Biology & Human Anatomy

The retina is a thin layer of light-sensitive tissue lining the back of the eye responsible for vision via nerve impulses through the optic nerve. The neurons of the retina are susceptible to damage and degeneration by many diseases. Glaucoma is the leading cause of irreversible blindness and specifically affects one population of neurons in the retina, the Retinal Ganglion Cells (RGCs). With virtually no cure, the option of corrective surgery and medication will only temporarily arrest further lost of vision. Full restoration of vision will require cell replacement via transplantation. Embryonic stem cells (ESC) and their pluripotency make them an ideal candidate for regenerative therapy. It is possible to generate retinal neurons from embryonic stem cells, however current protocols are limited by the low production of retinal ganglion cells. The goal of this research is to systematically test signaling molecules known to be involved in the differentiation, maintenance, and survival of RGCs during normal development to improve the yields of RGCs in ESC cultures. Ultimately, these tests will help lay a foundation for future remedial efforts.

Determining Nuclear Localization Signals in *Giardia lamblia*, an Intestinal Parasite

Kristofer F. Nguyen
Sponsor: Scott Dawson, Ph.D.
Microbiology & Molecular Genetics

Giardia is a protozoan parasite found in contaminated water. It infects 280 million people annually, causing diarrheal disease. We are interested in identifying genes associated with the metabolism, pathogenesis, and life cycle of *Giardia* as potential drug candidates. Although *Giardia's* genome has been sequenced, we have no methods for gene knockout; thus, we are adapting CRISPR-based genome editing tools for *Giardia*. We amplified Cas9 nuclease with a *Giardia* promoter and SV40 nuclear localization signal (NLS) sequence and introduced it into *Giardia*. Expression studies showed Cas9 localization to the cytoplasm rather than to *Giardia's* two nuclei. We hypothesized that the SV40 NLS was ineffective, and are using our collection of *Giardia* strains expressing GFP-tagged proteins to find an effective native *Giardia* NLS. Using NLS prediction software, we generated a list of putative *Giardia* NLS sequences in 65 known nuclear-localizing proteins and deleted these NLS's to test whether nuclear localization was affected. If NLS deletion causes loss of nuclear localization for these proteins, we will attach their NLS sequence to Cas9 and determine whether these *Giardia*-native NLS's can target Cas9 to the nuclei. CRISPR/Cas9 genome editing in *Giardia* could lead to further studies, including validation of anti-*Giardia* drug candidates.

Identification and Characterization of Components Required for Chloroplast Stromule Biogenesis

Lynh Nguyen
Sponsor: Savithramma Dinesh-Kumar, Ph.D.
Plant Biology

Dynamic tubular projections that protrude from the chloroplast envelope called stromules are found to play a role in plant innate immunity (Caplan et al., 2015). Stromules transport pro-defense molecules such as hydrogen peroxide¬ from chloroplasts to the nucleus, activating defense responses that prevent pathogen growth. Since we know very little about components required for stromule induction, my objective is to identify and characterize proteins involved in stromule biogenesis. Towards this goal, I have generated two transgenic Arabidopsis lines that each expresses a different chloroplast outer envelope protein fused with Citrine fluorescence protein. I have confirmed their localization to the chloroplast envelope by confocal microscopy. Using homozygous plants, I extracted chloroplast samples using percoll gradient from stromule-induced and non-induced conditions. These samples were used for immuno-isolation using GFP antibodies in order to increase chloroplast quality and purity. Currently, I am in the process of identifying the stromule-specific proteins by juxtaposing the proteins obtained from both samples using mass spectrometry. Characterization of proteins identified from stromule-induced samples will provide insights on function of proteins that are involved in stromule induction.

Functional Study of Wheat TT8 Protein in Regulation of Seed Coat Pigmentation

Veronica V. Nguyen
Sponsor: Julie Lee, Ph.D.
Plant Biology

In *Arabidopsis thaliana*, a highly-expressed gene during seed development, AtTT8, encodes for a protein involved in seed coat pigmentation. Mutation of AtTT8 causes seed coat to have an off-white color instead of a normally brown color. Through the transcriptome analysis of wheat (*Triticum aestivum*), we have learnt of TaTT8, a wheat gene that is homologous to AtTT8 and is also highly expressed during seed development. We hypothesize that TaTT8, similarly to AtTT8, controls seed pigmentation. We want to test the function of TaTT8 by complementation of the attt8 mutant. We plan to make a plasmid construct contains a fusion of the TaTT8/green fluorescence protein (GFP) coding sequence under the regulation of the AtTT8 promoter. We would then transform the construct to the attt8 mutant. If our hypothesis were correct, TaTT8 should be able to rescue the attt8 mutant and generate normal color seeds from transformed plants. We will also examine the subcellular localization of the TaTT8-GFP fusion protein in transformed plants. If TaTT8 is a transcription factor, we expect the GFP fusion to be localized in nuclei. Seed discoloration could affect the organism's development; this discovery would be appreciated since Wheat is an important domesticated food crop.

Suberin Is Super-In

Niba A. Nirmal
Sponsor: Siobhan M. Brady, Ph.D.
Plant Biology

Climate change has impacted farming by changing precipitation patterns, which cause divergent water levels that dramatically influence crop plant growth, especially of root systems. To understand the root response, I work on the crop model species tomato—*Solanum lycopersicum*. I predict that the exodermis, which protects against water loss to soil, and the polymer suberin, which regulates water and solute movement in exodermis, are vital for survival. Previous work in the Brady lab has shown the drought-tolerant tomato relative had a higher level of suberin than *S. lycopersicum*. My preliminary data has indicated a trend for higher suberin content in drought treated plants. In my experiment, I will characterize locations and concentrations of lignin and suberin in the different root zones: meristem, elongation, and maturation. Data will be collected through confocal microscopy and analyzed with ImageJ. I aim to discover the genes crucial for suberin synthesis and regulation by knocking out suberin transcription factors and biosynthesis genes, then analyzing the effects by utilizing hairy root transgenics in conjunction with the CRISPR/Cas9 genome editing system. I have genotyped and characterized transgenic tomato lines with cortex-specific nuclear and ribosomal tags, allowing for data collection on the genetic level.

Understanding Enzymatic Degradation of Cellulose

Audry K. Nishi
Sponsor: Tina Jeoh, Ph.D.
Biological & Agricultural Engineering

One innovative way to reduce dependence on non-renewable energy sources is to find alternative methods to produce fuels so they can be integrated into society and used on a daily basis. Cellulosic biofuels derived from agricultural residues and bioenergy crops offer one promising renewable source. Before this goal can be achieved, one must research conversion mechanisms at the microscopic level. This project analyzes the interactions between *Trichoderma reesei* (TrCel7A) enzymes and cellulose fibrils for the purpose of better understanding how enzymes hydrolyze cellulose. Currently, little is known about their interactions, and further research could help us understand how to facilitate cellulose degradation via enzymes. Using the method of Total Internal Reflection Fluorescence Microscopy (TIRF) and Image J software, we can clearly observe the enzymes and time how long they reside on cellulose fibrils. Longer residence times will indicate that the enzymes are binding by their catalytic domains. We will sort the residence times counting up how many stayed for the same amount of time. These results will represent the frequency at which enzymes bind for each residence time. This data will give us significant insight as to how these enzymes function when catalyzing the hydrolysis of cellulose.

The Role Low Molecular Weight Androgen Receptor Plays in Urothelial Bladder Cancer

Kristine S. Nishida
Sponsor: Maria Mudryj, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Men are three to four times more likely to get urothelial bladder cancer (UBC) during their lifetime than women. Recent studies have shown the gender difference may be accounted for by the androgen receptor (AR). Structurally, the AR contains four domains: the N-terminal transactivation domain, the DNA binding domain, the hinge domain, and the C-terminal ligand binding domain (LBD). Normally, androgen binding to the LBD induces translocation of the AR to the nucleus where it transcriptionally regulates genes. Overactive AR signaling is often involved in prostate carcinoma (PCa). As such, a typical treatment for patients is androgen deprivation therapy to reduce androgen levels. Unfortunately, treatment efficacy is often temporary and over time the cancer grows despite androgen ablation. One way these tumors survive is by producing low molecular weight (LMW) AR variants. These variants often lack the LBD which allows for constitutive AR activity. Although many LMW AR variants are well characterized in PCa, little is known about their roles in UBC. Thus far we have identified the well-known LMW AR variant, V7, from PCa in the UBC cell line UM-UC-3. Identifying the role LMW AR plays could elucidate how to improve UBC treatments.

Effects of Silicate-Associated Osteoporosis and Age on the Equine Cervical Spine (Neck)

Ashley B. Nola
Sponsor: Susan Stover, D.V.M.,Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Silicate-Associated Osteoporosis (SAO) is a progressively debilitating condition of horses that concurrently suffer from pulmonary silicosis and osteoporosis. Through an unknown mechanism, horses with silicosis lose bone density and become susceptible to painful deformities and catastrophic fractures. Neck stiffness is a prominent clinical feature in these horses. We hypothesized that the SAO- affected cervical spine is less mobile than a normal spine due to degenerative changes exacerbated by osteoporosis. The objective of this study was to differentiate the cervical vertebral changes due to SAO from natural, age-related changes. The cervical vertebrae of SAO horses with neck stiffness were compared to those of age- and sex -matched control horses without neck stiffness using post-mortem gross examination and computed tomography (CT) imaging. Preliminary findings show that the cervical vertebrae of SAO horses have diffuse and regional bone loss. Additionally, more so than in the matched control horses, joint congruity in the SAO cervical spine progressively declines as the vertebrae get further away from the head. These preliminary findings support our hypotheses that SAO horses have significantly accelerated degeneration of cervical vertebrae and more disintegration of the intervertebral connections than that explained by age alone.

The Role of State Capacity in Mediating the Effects of Foreign Aid on Economic Growth

Shelina Z. Noorali
Sponsor: Gabriella Montinola, Ph.D.
Political Science

Foreign aid can have positive or negative effects on economic growth. Proponents of aid argue that aid can lead to positive growth and is a useful tool in development. Opponents of aid point out the perverse outcomes of aid leading to decreased growth. My research investigates whether the bureaucratic capacity of a country, specifically a Weberian bureaucratic form, should be considered when donors allocate aid. Taking a sample of 35 countries, I test for the conditional effect of Weberian state capacity and net official development assistance (ODA) on economic growth rates covering the period 1970–1990. I find that while states with higher levels of Weberian bureaucracy promote more growth, this state capacity has a decreased effect on growth rates when aid is introduced. Weberianness has a positive effect on growth when there is zero aid and likewise, aid has a positive effect on growth in the absence of state capacity. More research is needed to understand how donors can leverage existing state institutions of recipient countries to maximize aid effectiveness.

Evaluating Cognitive Abilities in a Female Mouse Model of Rett Syndrome

Adriana Noronha
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Rett Syndrome is a neurodevelopmental disorder caused by mutations in the Methyl CpG binding protein 2 (MeCP2). MeCP2 is found on the X-chromosome, resulting in a prevalence of the syndrome in girls (1 in 10,000). Due to severe motor impairments common with Rett Syndrome, it is difficult to evaluate the patients' cognitive abilities. In addition, most animal studies on Rett Syndrome have focused on male mouse models, but few have explored the more relevant female models. Therefore, we assessed whether female mice heterozygous for *Mecp2* mutation showed cognitive impairments. By using learning and memory as a measure of cognition in mice, we examined two short-term memory tasks: Novel Object Recognition (NOR) and Object Location Recognition (OLR). We found that both MeCP2 heterozygous and wild type female mice demonstrated intact short-term memory during the tasks. Our findings show that short-term memory is not impaired by reduced levels of MeCP2, thus, basic cognition may be largely intact in Rett Syndrome patients. These findings present promising information for prospective translational and clinical studies. However, future work is necessary to examine other cognitive tasks, such as those testing long-term memory.

Conjugation of Genetically Engineered HEV-VLPs to Gold Nano-Clusters (Au102(pMBA)44) for VLP Tracking in Cells

Juliana W. Noronha
Sponsor: R. Holland Cheng, Ph.D.
Molecular & Cellular Biology

The capsid structure of Hepatitis E Virus (HEV) was modified to produce non-infectious virus-like particles (HEV-VLPs). VLPs retain the antigenicity, structural stability and cell binding capacity of the native virus. An Aspargine residue on the surface of the VLP was mutated to Cysteine (N573C), allowing the particle to covalently bind and expose ligands. This modulatable HEV capsid has potential to become a stable antigen and/or drug delivery platform. To study the capacity and efficiency of this platform, tracking VLPs in cells is critical. While purified virus-sized proteins are visible in cryo-electron microscopy (cryo-EM), distinguishing virus sized particles in cells remains a challenge due to labelling limitations. This study investigates conjugation of gold nano-clusters, Au102(pMBA)44, to the HEV-VLP cysteine via ligand exchange. Au102(pMBA)44 particles are ligand protected mono-dispersed nano-gold clusters with high electron density, allowing VLP structure detection and tracking in cryo-EM. For conjugation optimization, incubation time, temperature and reducing agents were compared. Following Au102(pMBA)44 conjugation to HEV-VLP, the focus turns to cryo-EM and 3D reconstruction to assess the degree of Au102(pMBA)44 occupancy on the VLP cysteine sites.

Long-Term Changes in Deep Soil Horizon Properties Resulting From Contrasting Farming Systems

Natasha Stacy Nuryadi
Sponsor: Randy A. Dahlgren, Ph.D.
Land, Air & Water Resources

Research on farming system impacts on soils has focused on surface horizons (0-15cm) corresponding to the primary rooting zone. However, there is a paucity of information concerning farming system impacts on deeper soil horizons. This study was conducted to evaluate how long-term farming practices and crop rotations influence deep soil properties at the UC Davis Russell Ranch Century Experiment. The accumulation of organic matter, nutrients, and salts that impact soil and environmental quality were investigated in soil cores taken to a depth of 3 meters in four experimental plots: tomato-corn organic, tomato-corn conventional, wheat with fertilizer, and wheat no fertilizer. Soil characterization parameters analyzed were: pH, electrical conductivity, organic and labile C, N fractions (total, mineralizable and available), available P, cation exchange capacity, and exchangeable cations. Results indicated that the deeper horizons have higher pH, lower concentrations of C and N, and lower exchangeable cations, except Na^{+}. For deeper horizons (1-3m), the tomato-corn organic and wheat with fertilizer treatments had higher Ca^{2+}, C and N contents and lower Mg^{2+} and Na^{2+} levels compared to their conventional and non-fertilized counterparts. Among the different systems, differences in measured soil properties were more prominent in the upper horizons than in lower depths.

Identification of Important Amino Acid Residues and Target Binding Site of a DNA-Binding Protein From the Cyanobacterium *Synechococcus* sp. PCC 7502

Heather Anne N. Ogana
Sponsor: John Clark Lagarias, Ph.D.
Molecular & Cellular Biology

As photosynthetic organisms, cyanobacteria have signaling systems that regulate movement toward or away from different qualities of light known as phototaxis. Exposure to highly intense or ultraviolet light results in the formation of reactive oxygen species that is damaging to the cell, including the genome and the photosynthetic apparatus. One well-studied negative phototactic system is the UirS-UirR system found in the cyanobacterium *Synechocystis* sp. PCC 6803, where the cyanobacteriochrome UirS detects ultraviolet light and activates the DNA-binding protein UirR, which then activates transcription of genes that promote negative phototaxis. In previous work, we have identified which amino acid residues are important for UirR-DNA binding interactions, as well as its target DNA sequence. We have since then identified a UirR homolog in another cyanobacterium, *Synechococcus* sp. PCC 7502, however its function remains unknown. In the experimental phase of this project, we seek to understand how this DNA-binding protein interacts with DNA by identifying its target-binding site and creating point mutations within the protein

Automated Board Loader and Project Decomposition

Christopher OKeefe
Sponsor: Jason Moore, Ph.D.
Mechanical & Aerospace Engineering

Automated Board Loader and Project Decomposition As technology continues to improve, a significant amount of industries are turning to automated processes for a variety of uses. Some of the main benefits of automation have been the reduction of human error and increased speeds during manufacturing. The primary purpose of our work will be to elaborate on the necessary steps required for completing a complex engineering automation challenge. With the assistance of Mirco-Vu, a precision measurement company based in Windsor, California, an automated board feeder to a saw and drill station that has the capacity to streamline a wood shop's workflow will be analyzed. The project stages accessed will consist of design conceptualization, budget, timeline management, fabrication and testing procedures. By showcasing the processes utilized in an automated system at the Micro-Vu woodshop, this work increases our understanding of not only engineering project management but also large project decomposition and overall execution.

Tracking the Historical Trajectory of Chinese-American Relations Through Media Representations

Eric Olsen
Sponsor: Jeanette B. Ruiz, Ph.D.
Communication

Significant knowledge gaps exist in the historical trajectory of how China and the United States portray each other through media. No relevant studies exist that track the valence of each media's prose at the aggregate level. Moreover, adequate research depicting the trends in media representations over a significant span of time is lacking. In order to fill these gaps, I have conducted a sentiment analyses of 350 American and Chinese newspaper headlines spanning from 1975–2015. The newspaper article headlines are broken down by categories (culture, political institutions, and economics) and then analyzed based on the rhetorical tone. Initial findings from analyzing rhetorical valence shows that both Chinese and American portrayals of one another have become more negative over time in each of the aforementioned categories. Examining this research can produce informed conjectures about the future cultural and geopolitical relations between these two nations, and serve to highlight any inherent cultural differences.

Language and Gender in Feminist Science Fiction

Amanda Ong
Sponsor: Colin Milburn, Ph.D.
English

Speculation is essential to science fiction. But while the genre can serve as a laboratory in which to carry out thought experiments about science and technology, science fiction has historically been hesitant to experiment with gender. Men have traditionally been presented as the scientists and astronauts who go out and change the world, while women, the wives and mothers of the scientists and astronauts, wait patiently at home. Feminist science fiction, which first emerged in the 1960s and 1970s, challenges the status quo about gender through narratives in which women are given more agency and power. Similarly, while language can be used as a tool of oppression, many science fiction authors use language to question and undermine traditional ideology. For example, in *The Left Hand of Darkness* by Ursula K. Le Guin, the main character adapts to a culture where there are no defined gender pronouns because every person is ambisexual. I will research how feminist thought and unconventional languages in *The Left Hand of Darkness* and *Native Tongue* by Suzette Haden Elgin work together to shape consciousness. By looking at the societal attitudes toward gender in these works, I will also examine how language affects the development of culture.

An Updated Optimal Feeding Model for High-Exercise Dogs

Neda K. Othman
Sponsor: Roberto D. Sainz, Ph.D.
Animal Science

Working or otherwise athletic dogs have physically demanding lifestyles that certainly require a diet different than that of a typical pet dog. The most recently published Nutrient Requirements of Dogs and Cats (2006) provides a feeding model that may be used to find the nutrient requirements of high-exercise dogs. However, some research performed later than its 2006 publication does not support its feeding model recommendations for athletic dogs, suggesting a need for revision. I intend to update the 2006 feeding model for the nutritional needs of high-exercise dogs using a meta-analysis like that described by animal nutritionists Sauvant et. al. (2008). A meta-analysis is an objective statistical review of many separate but related experiments. It can identify correlations between high levels of physical activity and certain dietary nutrients suggested by recent research. Thus far, I have collected 54 post-2006 papers using an organized search of one scientific database, demonstrating that our knowledge of physically active dogs' nutritional needs has progressed, and I am searching two other databases to compile a more comprehensive collection. I expect to develop improved equations to estimate nutritional needs of high-exercise dogs, as compared to the old feeding models proposed by the current Nutrient Requirements.

Crystal Structure Analysis of CTP Synthetase to Determine the Allosteric Binding Site of GTP

Silvio Ortiz
Sponsor: Enoch Baldwin, Ph.D.
Molecular & Cellular Biology

The enzyme CTP Synthetase (CTPS) makes the nucleoside triphosphate CTP de novo. CTP is a precursor to the building blocks of life: DNA and RNA. It has been observed that CTPS is regulated by the 4 nucleoside triphosphates. Experiments determined that GTP has both inhibition and activation characteristics. X-Ray Crystallography was used to determine the structure and the binding site(s) of the enzyme. However, the binding site(s) for GTP has not been determined for any of the published structures; this is essential to understand how GTP regulates CTPS. New experiments using a mutant of CTPS have yielded crystals under a new set of conditions in the presence of GTP. This suggests that the crystals can have GTP bound. Over a period of months an intense screening was conducted to determine which conditions yield crystals. Recently, we found the conditions that grow the best candidate crystals. In the present, we are experimenting with freezing and cryo conditions to store and send crystals to an X-Ray facility to subsequently make a model of CTPS with GTP binding sites, followed by validation using mutation assays. This research will help us determine the mechanism by which GTP allosteric interactions regulate CTP Synthetase.

Consent in Early British Novels: The Ramifications Then and Now

Anna Paivinen
Sponsor: Alessa Johns, Ph.D.
English

Today, in the twenty-first century, society often grapples with the idea of "consent." What is or is not consent? What kind of behavior requires consent? What does consent look like between two individuals? The present day construction is generally understood to mean that individuals always have the right to reject sexual advances. However, this principle is a modern creation that grew out of centuries of construction and deconstruction. With the rise of the novel, in late seventeenth to early eighteenth century England, literature became the main conduit for socialization and dissemination of ideas. Texts depicting heterosexual and/or domestic relations, such as Samuel Richardson's novels, set the standard for society's expectations regarding behavior and normalized problematic forms of what we would now consider to be issues of consent. I will be exploring the presentations of female consent in some of these widely-read novels by dissecting these normalized depictions of violence, domination, and sexual misconduct between "partners." Furthermore, by understanding the relationship between destructive representations of "acceptable" sexual behavior in early novels and their subsequent influence on society, a modern reader can identify the remnants of these ideologies underlying current questionable interpretations of "consent."

Forgotten: The Spanish Influenza Pandemic of 1918

Srijita C. Pal
Sponsor: Ian Campbell, Ph.D.
History

The Spanish Influenza pandemic of 1918 killed more individuals globally than World War I, yet it gathered little popular attention and failed to leave a literary or scientific mark, causing its near erasure in the American collective memory. The virus was strange because of its virulence and atypical patterns of infection. While soldiers struggled to define the flu and keep it from spreading, medical professionals tried to quell the rapidly growing public health crisis caused by outbreaks. This research extensively uses primary sources to show that the pandemic of 1918 was largely forgotten because dying in war due to influenza or any other disease was seen as less honorable than dying due to combat. The violent military deaths in combat overshadowed the death of soldiers dying of influenza. Consequently, those mourning felt guilty and placed less importance on the pandemic and more importance on "worthier" causes, such as the war effort. The pandemic was not written on in scientific publications until the late 1900s because in 1918, scientific advancements just were not advanced enough to explain the virus. How a population views a pandemic after its occurrence says much about how disease is viewed in society and in memory.

Examination of Mecp2-e1 Deficient Mouse Models to Identify Disease Mechanisms in Rett Syndrome

Rebecca Palmer
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Mutations in the *MECP2* gene encoding Methyl CpG Binding Protein 2 (MeCP2) has been found to be the cause of 80-90% of Rett Syndrome (RTT) cases. RTT is a rare (one in 10,000 live female births) but debilitating neurodevelopmental disease. As *MECP2* mutations are located on the X-chromosome, RTT is rarely seen in male patients because of early lethality. Two isoforms of the MeCP2 protein (MeCP2-e1 and MeCP2-e2) are produced due to alternative splicing of exons 1 and 2 to exons 3 and 4. While the entire function of individual MeCP2 isoforms is still not clear, MeCP2 protein isoforms bind to methyl groups in DNA and act as transcriptional regulators. It is also known that MeCP2 is very important for normal neurological function. Our working hypothesis is that maturation of neurons is defective without functional MeCP2. One current project of the lab is to create models of the human MeCP2-e1 mutation in mice. We then examine the neurons of the diseased animals *in vitro* to find out the specific function of MeCP2-e1. My portion of this project is to breed, genotype and phenotype MeCP2-e1 animals for these studies.

Effects of Intranasal Oxytocin in Infant Prairie Voles on Receptor Density in Regions Involved in Social Behavior

Tiffany V. Parks
Sponsor: Karen Bales, Ph.D.
Psychology

Oxytocin is a neuropeptide currently being used in clinical trials as a treatment for disorders with social deficits, like autism. However, the long-term effects of chronic exposure to intranasal oxytocin are mostly unknown in both humans and animals. Prairie voles are a socially monogamous rodent used to study complex social behaviors such as monogamy. Exposure to oxytocin during different developmental periods can have long-term effects on social behaviors as well as brain organization. This study seeks to find how exposure to intranasal oxytocin during the infant stage affects neural development. Voles were given intranasal oxytocin (0.8 IU/kg) once a day from postnatal day 8 to 15. Once they reached sexual maturity, they underwent partner preference testing. We are interested in determining if observed differences in behavior are associated with changes in neural pathways involved with social behavior. To do so, we are quantifying receptor density of oxytocin and vasopressin (a structurally similar neuropeptide) in the nucleus accumbens, lateral septum, basal nucleus of the stria terminalis, medial preoptic area, and central amygdala. Differences in receptor density in these regions may provide insight into the neural mechanisms underlying social monogamy.

Fabricating Light Guides With Rapid Prototyping Technologies for New PET Detectors

Brijesh Patel
Sponsor: Simon Cherry, Ph.D.
Biomedical Engineering

New detectors are needed to accommodate the new geometry of a high sensitivity positron emission tomography (PET) scanner under development at UC Davis. Our detector design (and many other clinical scanners), has a large number of individual detector elements (scintillator crystals) which are read-out with 4 photodetectors. The crystal, built in a 2D array, are coupled to photodetectors using a light guide, which controls light spread from the crystals to photodetectors allowing each individual crystal to be resolved. This work uses rapid prototyping to develop light guides for our high performance PET detector design. Light guides are fabricated using a laser cutter to cut slots of varying depths into the acrylic to control light spread from adjacent crystal rows. Incorporating a tapered edge keeps light from outer crystals to the outside of the detector. We were able to resolve an 11x11 crystal array with only 4 photodetectors, minimal manual error, and excellent reproducibility. We tested with various crystal sizes achieving consistent crystal resolvability. Ultimately, a complete block detector incorporating best light guides will be used to measure the full detector performance (spatial resolution and temporal resolution). Continuing on this work, we seek to expand this procedure to larger crystal arrays.

N1-119 Resistance to Xanthomonas Oryzae Pv. Oryzae (Xoo)

Reshma Patel
Sponsor: Pamela C. Ronald, Ph.D.
Plant Pathology

The rice receptor kinase XA21 confers robust resistance to a bacterial blight caused by Xanthomonas oryzae pv. oryzae also known as Xoo. In order to study the XA21-mediated immunity of this disease, the Ronald Lab has generated a collection of these rice fast-neutron mutants in a Ubi::XA21 background. In a preliminary assay, one of the mutants, named N1-119, had displayed partial resistance to Xoo. Based on sequencing analysis, it was noted that this mutant carries a deletion on rice chromosome 2. This was further confirmed through the processes of genotyping. Using the method of quantitative reverse transcription PCR, I was able to show that the genes within this deletion region were no longer expressed. Taken together, these results confirm the deletion in N1-119 mutant strain. However, further analysis will be carried out to determine whether this deletion is able to co-segregate with the phenotype after the susceptible phenotype can be repeated.

Discovery of Novel Fungal Allergens

Rasika S. Patkar
Sponsor: Patrick Leung, Ph.D.
Internal Medicine
School of Medicine

Although numerous species of fungi have been associated with allergic diseases in literature, many allergenic fungal species are yet undiscovered. The goal of this study is to examine the allergenic potential of proteins in the fungal samples from ascospores. These ascospores were initially collected from local air samples, cultured in laboratory media and identified by rRNA sequencing. Mycelia extracts from four of these fungal species were then resolved by SDS-PAGE gel electrophoresis and examined for specific serological IgE antibody reactivity by immunoblotting. The data showed that three of the extracts contained IgE reactive proteins when probed with sera from patients with mold allergies. The same proteins did not react to sera from non-fungal allergic subjects. Interestingly, these three fungal extracts correspond to Acremonium sclerotigenum, Leotiomycetes and Lecythophora, which were not previously reported as allergenic fungi. Current work is directed to identify these allergenic proteins at the molecular level. This work will lead to the identification of novel fungal allergens, which can then be translated into immunotherapy to treat patients with fungal allergies.

High Temperature Powder X-Ray Diffraction of Ho_2O_3, Er_2O_3, Yb_2O_3, and Lu_2O_3

Alfred J. Pavlik
Sponsor: Alexandra Navrotsky, Ph.D.
Chemical Engineering & Materials Science

There is a lack of structural data for most rare-earth sesquioxides above 1500°C. The data are necessary for creating phase diagrams used in high temperature applications such as thermal barrier coatings. High temperature powder X-ray diffraction experiments on laser heated Ho_2O_3, Er_2O_3, Yb_2O_3, and Lu_2O_3 aerodynamically levitated in Ar and O_2 flow were performed at Advanced Photon Source. Temperature of the sample surface was measured by radiation thermometry. Cooling curves of each oxide were analyzed to evaluate atmosphere effect on the melting temperature. Diffraction data was analyzed with FIT2D and GSASII software to render values for lattice parameters, isotropic thermal parameters, atomic displacement parameters, thermal expansion coefficients, and identify any structural changes. Lu_2O_3 and Yb_2O_3 retain cubic C-type structure up to the melting temperature. Comparison of data collected in O_2 vs. Ar flow indicated no substantial effect of atmosphere on melting temperatures or thermal expansion of C-phase. However temperature of phase transition from cubic to hexagonal phase for Ho_2O_3 and Er_2O_3 was affected by atmosphere. It was observed at 2100°C and 1850°C in Ar and at 2200°C and 2000°C in O_2. C-H transition was accompanied by molar volume decrease of 3.4-3.9%.

The Latin American Child Migration Crisis and Mental Health Implications

Anna L. Peare
Sponsor: Luis E. Guarnizo, Ph.D.
Human Ecology

Between 2014 and present-day, thousands of unaccompanied child migrants have fled gang-related violence and economic hardships in Central America, making the harrowing journey north to the United States. Once in the United States, the majority of these unaccompanied minors are detained in family detention facilities around the country for upwards of two years before they are granted asylum or deported back to their country of origin. I am investigating the mental health issues that these child migrants endure, both while on their journey north as well as during their time in detention centers. I will examine the likelihood of certain illnesses, including depression and anxiety, as well as the impact of migration on child development. I will be using existing literature on migration, mental health, and child development, while also conducting interviews with employees of the Department of Homeland Security, detention facility workers, and child migrants. I hope my research will bring more light to the Latin American child migration crisis, while also delving deeper into the mental health of child migrants.

Français de Souche, Français de Sol: National Identity and Immigration in Contemporary France

Sarah M. Pearson
Sponsor: Jeff Fort, Ph.D.
French & Italian

In 2010, French Prime Minister François Fillon asked the French citizens: What is the French national identity? In my research, I explore this question by studying recent immigration policies and reactions to these policies. I used Patrick Weil's Le sens de la république (The Sense of the Republic), a collection of essays regarding the future of France, and Alain Minc's Un français de tant de souches (A Frenchman of Many Origins), a study of the existential problems facing France today; both of which were published last year and describe the French nationality. I am also using articles and essays on national identity and immigration written by well-known politicians and authors in France, such as Emmanuel Todd, a political scientist from Paris, Eric Zemmour, a political journalist, and Alain Finkielkraut, a philosopher. For decades, France has struggled to define itself. From unrest in the suburbs of Paris to the terrorist attacks last year, how France decides to address these issues is rooted in how they see themselves as a nation. Studying the definition and perception of a French citizen through immigration laws and the Constitution reveals what constitutes a French citizen and France as a whole.

Differences in Mexican Origin Childhood Obesity Intervention

Ana Isabel Perez
Sponsor: Yvette G. Flores, Ph.D.
Chicana & Chicano Studies

Niños Sanos, Familia Sana (NSFS) is an interdisciplinary five-year research project that aims to reduce the BMI/obesity of children in Firebaugh, a Mexican-heritage community in California's Central Valley. Golden Plains Unified School District (GPUSD) serves as the comparison site, which consists of five communities. These communities were chosen and matched based on similar demographics reported by the Census data. During the first year of the study, we administered household level surveys to collect baseline data for all participants on their sociodemographic characteristics, and parenting styles. Anthropometric measure were also collected to calculate participants' BMI. Through an analysis of variance (ANOVA) we found significant differences amongst the communities on sociodemographic characteristics, BMI, and parenting styles. These differences are an important consideration to the implementation of the culturally-relevant activities in Mexican-origin communities. Implications for future research indicates the need to integrate community-based participatory research (CBPR) during the early stages of the research to address cultural and contextual differences.

Lipid Coated Mesoporous Silica Nanoparticles Embedded With Ultrashort Carbon Nanotubes as Drug Delivery Agents

Bradley Petkus
Sponsor: Pieter Stroeve, Ph.D.
Chemical Engineering & Materials Science

Over the last few decades, development of novel drug delivery has been of increasing interest to the scientific community. Lipid nanoparticle systems have historically been investigated for this purpose with aims for controlled release kinetics due to their high biocompatibility and biointegration. The system presented incorporates a design of robust nanoparticle delivery agents with release mechanisms utilizing lipid coatings. As of recent, ultrashort carbon nanotubes have been implemented as porins in the lipid membrane for drug delivery applications, however these carriers still have some drawbacks in functionalization and dispersion stability when integrated into lipid systems. Investigated here is the treatment of cleaving and functionalizing multi- and single walled carbon nanotubes (SWCNT) to <10 nm length scales and their integration into lipid membrane systems. It is theorized that by embedding SWCNTs into lipid vesicles and lipid coated mesoporous silica nanoparticles the CNTs will function as a channel; similar to membrane proteins that selectively transport species across the lipid bilayer.

Dreams, Children, and Ghosts: The Works of Nona Fernández

Sara Z. Phelps
Sponsor: Michael J. Lazzara, Ph.D.
Spanish & Portuguese

Memory and forgetting are key issues in societies grappling with the consequences of state violence. In recent years, a generation of Chilean authors and artists that grew up during the Pinochet dictatorship has created work that offers new paradigms about childhood, memory, and state violence. In this paper, I analyze the work of Chilean author, playwright, actress, and director, Nona Fernández. I am interested in tracing the recurrence and evolution of motifs, structures, and narratives throughout Fernández's novels and plays. Through her use of postmodern literary techniques that break with linear conceptualizations of space and time, I argue that Fernández's texts, with their admixture of images and temporalities, function as a series of societal dreams whose intent is to critique and interrupt the neoliberal structures of Chilean society. The author's deployment of dream signs critiques the postdictatorial culture of forgetting and galvanizes audiences to examine the ghosts of the dictatorial past that continue to haunt Chile's present. My analysis hopes to raise provocative questions about the potential and limitations of political art as a disruptive practice in neoliberal societies.

Elevated Intramuscular Calcium Effects on Mitochondrial Biogenesis

Dagoberto PinaJr
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

Caffeine is known to raise intracellular calcium (Ca^{2+}) levels in the brain; however, the effects of caffeine consumption on intramuscular Ca^{2+} and subsequent mitochondrial biogenesis have not been addressed *in vivo*. To determine whether caffeine can increase intracellular calcium levels in skeletal muscle and stimulate mitochondrial biogenesis. Mice were administered caffeine (0.2 mg/mL) through their water for 7 days. At the end of seven days of caffeine treatment, intramuscular calcium levels were determined through a modified patch clamp technique. Following determination of intramuscular calcium, muscles were excised and rapidly frozen in liquid nitrogen prior to analysis of mitochondrial protein levels by western blot. Antibodies used include p-CAMKII Thr286 as a measure of CAMK activity, COX5, COX4, HAD, LCAD, MCAD, VLCAD, Cytochrome-C, CD36, CPT-1, citrate synthase, and PGC1-α. Caffeine treatment increased intracellular Ca^{2+} levels (CON=113nM, CAF=156nM; $p<0.05$). However, the increased intramuscular Ca^{2+} was not sufficient to modify the levels of mitochondrial proteins ($p>0.05$). Caffeine treatment increases intramuscular Ca^{2+} levels but is not sufficient to drive mitochondrial biogenesis. However further studies are needed to determine whether caffeine could augment the effects of endurance training on mitochondrial mass.

Small Cues Make a Big Difference: Strategic Email Communication in Professional Contexts

Sarah Pollock
Sponsor: Bo Feng, Ph.D.
Communication

Individuals use all interpersonal cues available to form impressions upon first contact with a stranger. Those cues are severely limited for receivers of text-based messages, such as emails. The few cues that are not "filtered out" in email communication, including a sender's email username and subject line, may influence email recipients' responses. While prior research has shown that individuals form impressions based on email usernames, no empirical research to date has demonstrated the impact of usernames on the achievement of interpersonal goals. Additionally, no research has explored the impact of subject line clarity on responses to strangers. This study on email communication tests the hypothesis that the use of a professional email username and a clear subject line will increase the likelihood of a response to a request made in a professional context. A 2x2x3 factorial design was used, with username, subject line and time of sending as the independent variables. 1,200 university professors were randomly assigned to one of the twelve experimental conditions. Subjects received an email from the researcher requesting participation in an online survey. Whether or not the email was opened, as well as whether the recipient took the survey, were recorded as the outcome measures.

Improving Engineered ACL Function Using Cytokines

Briana M. Pompa-Hogan
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

Anterior crucial ligament (ACL) tears occur approximately 200,000 times annually. ACL function is determined by the ligament's collagen content and crosslinking. Interleukin-15 (IL-15), a cytokine stimulated by exercise, improves collagen content in the skin; however, IL-15 effects on collagen content in ligaments have not been determined. The goal of this study was to understand the effects of IL-15 on ACL function, collagen content, and tensile strength. Methods: Ligaments engineered from primary ACL fibroblasts were split into 4 groups and treated with A) DMSO (control); B) 10 ug/ml IL-15; C) 10 ug/ml Rapamycin; or D) Rapamycin and IL-15. Post-treatment, maximal tensile load, ultimate tensile strength (UTS), modulus, and collagen content were determined. Results: IL-15 increased mechanical strength (UTS for DMSO=0.33±0.023 MPa; IL-15=0.72±0.05 MPa ($p<0.05$); Modulus for DMSO=2.1±0.41 MPa; IL-15=5.8±0.6 MPa ($p<0.01$)) and the collagen content (DMSO=241±20.7 µg; IL-15=340±16.1µg ($p<0.05$)) of the ligaments. Concurrent treatment with rapamycin prevented the beneficial effect of IL-15, but rapamycin alone had no effect on the engineered ligaments. Conclusions: These data suggest that IL-15 increases collagen synthesis in an mTORC1 dependent manner. If confirmed, this would suggest that IL-15 can reduce the risk of ACL rupture by improving ligament strength.

Concept Mapping Cardiovascular Health and Physical Activity: A Model for Health Promotion Decision Support Ontologies

Vimala M. Ponna
Sponsor: Matthew Lange, Ph.D.
Food Science & Technology

Current cardiovascular disease (CVD) decision support systems (DSS) rely primarily on databases and ontologies that characterize and quantify disease, recommending appropriate pharmacotherapy (PT) and/or surgical interventions (SI). PubMed and Google Scholar searches reveal no specific ontologies or scientific literature related to DSS for recommending physical activity (PA) for cardiovascular health and fitness (CVHF) improvement. This dearth of CVHF-PA structured knowledge repositories has resulted in a scarcity of user-friendly tools for scientifically validated information retrieval about CVHF improvement. Advancement of health science depends on timely development and implementation of health (vs. disease) databases and ontologies. We developed a time-efficient workflow for constructing/maintaining structured knowledge repositories capable of providing informational underpinnings for CVHF-PA DSS that support health promotion, including precise, personalized exercise prescription. We employed open source and commercial off the shelf (COTS) technologies as part of semi-automated workflows for concept lattice extraction from literature. These workflows created conceptual lattices about effects of varied PA on CVHF. Workflows enable conversion of textual annotations from literature into semantic triples, known as knowledge propositions, and creation of semantically-enabled repositories with information combined from many sources. Knowledge gleaned from multiple sources integrates into one conceptual map with visualization of new and unexpected relationships.

Of Noise and Nests: Testing the Effects of Noise Pollution on Settlement Patterns in a Native, Declining Bird

Lauren Poon
Sponsor: Gail Patricelli, Ph.D.
Evolution & Ecology

The world's rapid increase in urbanization is accompanied by an alteration in the acoustic landscape of both urban and natural environments, as sound travels far beyond its source. Anthropogenic noise, notably traffic noise, contributes to high levels of noise pollution and can result in reduced species richness, likely due to decreased habitat quality. Avoidance of noisy habitat may lead to conservation concerns, as other anthropogenic impacts, such as intensive agriculture, have already decreased suitable habitats for many birds. Therefore, it is important to understand noise impacts on habitat quality to preserve biodiversity. Here, I will investigate the effects of traffic noise on settlement patterns in Tree Swallows (*Tachycineta bicolor*), an insectivorous, native bird that has suffered population declines over the past decade. By experimentally exposing nest boxes to traffic noise before Tree Swallows return from winter migration and recording settlement date (a proxy for nest site preference), I will test the hypothesis that noise decreases habitat quality and alters settlement patterns. Further, I will assess if lower quality individuals nest in noise by recording the number and mass of eggs, a proxy of parental investment, in noise and control treatments.

An Investigation Into the Role of Essential DNA Polymerases During Meiotic Recombination Associated DNA Synthesis

Mohammad S. Pourhosseinzadeh
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

During meiosis, homologous recombination initiates upon formation of double strand breaks (DSBs). DSBs are resected allowing a resultant 3' overhang to invade a donor DNA template to synthesize missing DNA, forming joint molecules that may be processed into crossovers or non-crossovers. Crossovers are essential to the physical interaction between homologs during disjunction, preventing aneuploidy, the cause of genetic disorders such as Down syndrome. However, the DNA synthesis that forms joint molecules remains poorly characterized. We would like to understand the exact mechanism of DNA synthesis during homologous recombination repair of DSBs during meiosis, examining the main replicative polymerases, delta and epsilon. We will be using *S. cerevisiae* containing a mutant background that arrests after chromosome replication but before the formation of DSBs to examine the loss of these polymerases specifically in recombination without perturbing chromosome replication. Previous research has utilized temperature sensitive mutants; however, meiosis itself is temperature sensitive, thus the use of such mutations can cause defects in meiosis. As an alternative mechanism to explore the function of these polymerases we will use the auxin inducible degron system to selectively target these polymerases for degradation to observe their subsequent phenotype.

Isolation and Characterization of SJL Astrocytes

Shalvi Prasad
Sponsor: Lillian Cruz-Orengo, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Multiple sclerosis (MS) is an autoimmune disease in which leukocytes attack myelinated sheets, which are necessary cell signaling. This disease shows sexual bias where 85% of MS patients are women with the relapsing-remitting MS (RRMS) form; the reason is unknown. Among the different experimental models used to study MS, only female SJL mice show the same relapsing-remitting progression. Increased permeability of the Blood-Brain Barrier (BBB) is hypothesized to be a key contributor to female predisposition to RRMS. An *in vitro* BBB model, with a Brain Microvasculature Endothelial Cell (BMEC) and an astrocyte component, has been developed using the C57BL/6 mouse strain and will be used to guide development of the SJL *in vitro* BBB model. My project is to isolate and characterize astrocytic cells which will be a component in creating an artificial BBB. In order to create an experimental model relevant to studying sex bias, I will be isolating cell cultures by sex by genotyping each mouse sample. I will then characterize the cultures by immunocytochemistry (ICC). Proper development of the model can be used in future studies to investigate sexual bias involving BBB physiology. Ultimately, we hope to use this model to develop better treatments for MS patients.

New Zintl Phase for Thermoelectric Applications: $Yb_{2-x}Eu_xCdSb_2$

Phichit Promkhan
Sponsor: Susan M. Kauzlarich, Ph.D.
Chemistry

Thermoelectric materials operate according to Seebeck effect that claims a temperature difference can be turned into electricity. These materials are composed of dissimilar thermoelectric materials: p-type (hole) and n-type (electron) semiconductors. When semiconductors are heated on one end and simultaneously cooled on the other, the holes and electrons at the hot end would have higher energy and diffuse to the cool end resulting in a voltage potential. Thermoelectric efficiency depends on a figure of merit (zT), where thermal conductivity is minimized and electrical conductivity and Seebeck coefficient are maximized in order to achieve a large zT. Zintl phases are ideal candidates for thermoelectrics because their complex structures consist of heavy atoms leading to mass disorder, and have large unit cells. These complex structures increase phonon scattering to lower thermal conductivity. Electrical conductivity and Seebeck coefficient are adjustable by substituting cation or anion on sites of Zintl phases. $Yb_{2-x}Eu_xCdSb_2$ is a Zintl phase solid solution that has Eu substitution on Yb sites to create mass disorder to scatter phonons. This phase shows high Seebeck coefficient at low temperatures, and herein we investigate its synthesis for potential high temperature property measurement.

Evaluation of a Potential Positive Feedback Loop in the Interplay Between Hypoxia and TGF-β Signaling in Osteoblasts

Roy W. Qu
Sponsor: Damian Genetos, Ph.D.
Anatomy, Physiology & Cell Biology
School of Veterinary Medicine

Hypoxia of the tumor microenvironment is a hallmark of tumor progression and helps establish tumor angiogenesis through HIF-mediated hypoxia signaling and subsequent expression of the pro-angiogenic vascular endothelial growth factor. Several lines of evidence in cancer have implicated HIF-1α and TGF-β1 as positive regulators of each other's activity and expression. Moreover, HIF-1α and TGF-β1 increase lactate production which has also been shown to control HIF-1α and TGF-β1 expression. Together, these reports suggest a positive feedback loop within hypoxia and TGF-β signaling crosstalk. Recent work on osteoblast bioenergetics has renewed interest in the metabolic requirements of osteoblast function. Despite the importance of hypoxia signaling in endochondral bone formation and fracture repair, two processes driven early on by ischemia, little is known about the role of lactate in bone physiology. I hypothesize that lactate can potentiate hypoxia and TGF-β signaling in osteoblastic UMR106.01 cells and induce a positive feedback loop. To test this hypothesis, I will use the SBE4 and PGK1-HRE luciferase plasmids, reporter constructs of TGF-β and hypoxia signaling, respectively, and analyze lactate's effect on their activity. Dissection of such interplay may ultimately lead to improved therapeutics in cancer treatment, osteogenic repair, musculoskeletal disease, and more.

The Effect of Feeding High or Normal Protein Diets to Piglets on Protein Digestibility and Putrefactive Metabolism

Yunyao Qu
Sponsor: Daniela Barile, Ph.D.
Food Science & Technology

The metabolic products of protein fermentation (putrefaction) caused by incomplete protein digestion are toxic and can cause tissue inflammation. This study investigated protein digestibility and putrefactive metabolism using four diets with normal protein levels as well as high dietary protein provided as either intact, hydrolyzed or intact protein with a supplemental protease to assist in digestion in vivo. Sixteen 21-day-old piglets were fed the four diets (one control diet and three high protein diets) for 14 days. Serum and urine samples were collected at the end of the study and analyzed via NMR. Principal component analysis of the identified metabolite concentrations in both serum and urine demonstrates distinct differences between the control and the hydrolyzed protein groups and the high protein and high protein with protease groups. However, neither urine nor serum revealed any distinction between the high protein and high protein with protease group. These preliminary results suggest that dietary protein concentration and protein hydrolysis might influence the degree of putrefaction in the gut. Further research in this area will provide insight into the degree to which putrefaction leads to gut inflammation and whether protein hydrolysis or added enzymes can lower this problem.

Can You Feel That?

Veronica Quiroz
Sponsor: Paul Salitsky, Ph.D.
Neurobiology, Physiology & Behavior

Most would view dance as an art but have never thought about how dancers are actually able to do what they do and make it look effortless. This research is geared to look at a dancer's ability to self correct in the classroom. The question of interest was, "Can a dancer use intrinsic feedback to correct themselves in the studio?" The research looks at the learning style of individual dancers and how that correlates to their ability to intrinsically feel whether or not they are completing a movement correctly or incorrectly. The study also looked at a dancer's experience in terms of style and years of training and drew conclusions about their ability to use self correction techniques. This research is important because not only is self correction an important dance skill, but it could also be a valuable asset to how one looks at injury prevention. This information could also transfer beyond the scope of the arts. This research was completed via observation of UC Davis dance classes, interviewing a focus group, and distributing a survey.

Reversible Deactivation of the Posterior Parietal Cortex: Implications for Manual Grip Posture

Raisa A. Rahim
Sponsor: Leah Krubitzer, Ph.D.
Psychology

The posterior parietal cortex (PPC) is a constellation of distinct regions of the cerebral cortex implicated in a wide variety of motor planning behaviors, including coordinated reaching and grasping. These functions require the integration of visual, tactile, and proprioceptive information, and it is thought that the PPC integrates different modalities of sensory input in order to select the appropriate movements for a given context. While previous work has demonstrated that neuronal activity in these regions is correlated with different reaching and grasping behaviors, this alone does not establish whether these regions are necessary to complete those actions. To test this, rhesus macaques were surgically implanted with cooling devices that reversibly deactivate different PPC regions. The monkeys' ability to successfully regulate hand posture was examined during performance of a manual dexterity task and quantified using behavioral coding of video data. Preliminary results suggest that deactivation of the PPC may lead to a decrease in the ability to form a precision grip, as well as in the ability to coordinate visual and tactile cues to effectively execute the reaching and grasping behaviors. This information may provide insight into various movement disorders that result from damage to this area of the brain.

Cingulate Cortex Gray Matter Loss of Fragile X Pre-Mutation Carriers and Its Age-Dependency

Bhavana Rai
Sponsor: Susan Rivera, Ph.D.
Psychology

Fragile X-Associated Tremor/Ataxia Syndrome (FXTAS) is a late-onset neurodegenerative disorder that is associated with the presence of the fragile X pre-mutation in the Fragile X Mental Retardation 1 (FMR1) gene. The fragile X pre-mutation consists of 55-200 CGG repeats in the 5' untranslated region of the FMR1 gene. Approximately 40% of older men with the fragile X pre-mutation will develop FXTAS, typically after age 50. Early volumetric studies have associated cerebral, cerebellar, and generalized brain atrophy with FXTAS. A recent voxel-based morphometric study by Hashimoto et al investigated gray matter loss in cortical and subcortical regions, finding reduction in the medial and lateral surface of the brain including the anterior cingulate cortex between healthy controls and pre-mutation carriers with FXTAS. In the current study, we are conducting semi-automated segmentation and volumetric analysis of structural magnetic resonance imaging (MRI) scans to examine whether volume atrophy in the cingulate cortex displays accelerated age-dependent change in younger (< age 50) pre-mutation carriers without clinical diagnosis of FXTAS. Younger pre-mutation carriers are expected to show faster gray matter loss relative to healthy age-matched controls.

How Does Skin (Ectoderm) Thickness Shape Anemone-Symbiont Partnerships Across a Species Range?

Abhineet Ram
Sponsor: Richard K. Grosberg, Ph.D.
Evolution & Ecology

Mutualisms between Cnidarians and photosynthetic endosymbionts form the foundation of diverse coral reef ecosystems that thrive in otherwise nutrient-poor environments. Along the California coast, the sea anemone Anthopleura xanthogrammica forms similar mutualistic interactions with two endosymbiont species. Success of one symbiont over another depends on host morphology, potentially leading to locally adapted host-symbiont combinations. The endosymbiont Symbiodinium prefers bright habitats and tends to thrive when host tissues are thin. Alternatively, the endosymbiont Elliptochloris marina prefers dimmer environments. Consequently, E. Marina favors thick tissues, and is restricted to northern latitudes. Here, I compare the morphology of A. xanthogrammica in the northern and southern portions of its range, where it transitions between hosting either symbiont to hosting only Symbiodinium. I measured the tissue layers of anemone tentacles from Trinidad, Bodega Bay, and Big Sur, California. My data supports the hypothesis that local interactions with the subset of symbionts that prefer high-light environments result in thinner tissue layers in the south. This ability for hosts to modify its tissue layers leads to optimal performances from the symbiont, and therefore the overall success of both host and symbiont. This helps to better predict how local host-symbiont interactions will respond to a rapidly changing climate.

Episodic Memory for Emotion Words

Anacary Ramirez
Sponsor: Beth A. Ober, Ph.D.
Human Ecology

Several studies have shown that there is a processing advantage for positive (versus negative) emotion-laden words for both native and and non-native English speakers, with a larger effect in native speakers (e.g., Kazanas & Altarriba, 2015). The purpose of the current study is to identify if native English speakers remember relatively more positive versus negative valence English words than non-native English speakers. Memory will be tested by asking the participants to recall an orally presented list containing positive and negative words, immediately after each of three presentations, after a short delay, and after a long delay. Following the delayed recall test, the participants will be given a yes/no recognition test. For the purpose of this study, our non-native English speakers will not have learned English until after the age of 12, whereas our native English speakers will not have learned a second language until after the age of 12. These findings will hopefully enhance our understanding of the relationship between bilingualism and emotionality, and lead to further studies on the topic.

Analysis of Stomata and Pavement Cell Densities in Tomato Introgression Lines Reveals Parental Traits Governed by Specific Regions of the Genome

Eduardo Ramirez
Sponsor: Neelima R. Sinha, Ph.D.
Plant Biology

Global climate change along with an ever increasing population mandate constant improvements in agriculture to meet nutritional demands. This has prompted the development of new genetic techniques to generate stress tolerant crops. In order to study stress tolerance genes in tomato, scientists created partial hybrids by inserting small, homozygous regions of *Solanum habrochaites*, a poisonous, stress-resistant wild tomato species, into the domesticated tomato species *Solanum lycopersicum var E6203* through refined breeding methods. Preliminary data showed density differences between parents in stomata, structures in the leaf controlling gas exchange and water loss, and pavement cells, the protective outer layer of the epidermis. The goal of my project is to uncover the regions of the genome that are responsible for the epidermal patterning differences between *S. habrochaites* and *S. lycopersicum var E6203*. Thirty eight hybridized introgression lines (ILs) were selected containing different introgressions with known stomatal effect genes. Stomata and pavement cells on the abaxial (bottom) and adaxial (top) sides of terminal leaflets from at least three biological replicates were counted. Significantly different ILs were discovered using pairwise, false discovery adjusted analyses against *S. lycopersicum var E6203*. My data definitively shows that epidermal patterning is governed by multiple regions on the genome.

Manufacturing Distortion of Aluminum Parts for Aerospace Application

Susana Ramirez Perez
Sponsor: Barbara Linke, Ph.D.
Mechanical & Aerospace Engineering

Dimensional instability, also called distortion, in manufacturing is a critical problem. One hypothesis is that the main cause of distortion in aerospace components is residual stresses in the material. The experiment focuses on quenched aluminum 7050 T74. Residual stresses are inherent tensile or compressive forces in the material and are induced from material processing. Our goal was to prove the hypothesis in a relevant case study and to enhance our understanding of distortion. In order to observe the distortion in the sample material, blanks of the same dimensions from different locations in the blanks are machined into U prismatic shaped parts. Then Taylor-Hobson Talyscan measurements are taken to quantify the distortion. Sample pieces cut from different sections of the bulk material vary in residual stresses present, and therefore it is expected that pieces cut from areas with higher compressive or tensile stresses have higher levels of distortion. The results of the experiment demonstrate that residual stresses play a critical role in distortion. The middle blank had a maximum distortion of -0.04 millimeters from the neutral plane. The overall goal of the research is to minimizing distortion, so manufactures can provide parts with better quality and higher strength at lower cost.

The Baby-Associated Built Environment (BABE) Microbiome Project

Pavitra Ravishankar
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Before birth infants are nearly sterile but are immediately exposed to a wide array of environmental microbes upon birth. One microbial group common to the infant gastrointestinal tract, bifidobacteria, may assist in the development of the infant immune system. Bifidobacteria are less prevalent in infants in developed countries, possibly due to differences in transmission to infants. The Baby-Associated Built Environment (BABE) Microbiome Project investigates this possibility in three ways: analysis of the microbiota of manmade environments that might mediate transmission of bifidobacteria, studies of the survival of a model bifidobacteria (*Bifidobacterium longum* subsp. *infantis*) outside the gastrointestinal tract, and surveys of the gut microbiota of infants with different levels of social exposure. Results indicate that bifidobacteria can be found in the built environment, where they may survive for up to two weeks. These results support the hypothesis that bifidobacteria are transmissible via the built environment, however, there is no clear answer yet as to what the predominant source of these extracorporeal bacteria is. Further study may yield greater insight into the impact of differing levels of exposure to environmental bifidobacteria on the infant gut microbiome.

You Affect Me: The Influence of Activities, Friends, and Parents on Academic Achievement

Sara J. Ramos
Sponsor: Katherine J. Conger, Ph.D.
Human Ecology

Research has shown group memberships (Wentzel & Caldwell, 1997), parent involvement (Fan & Chen, 2001), and friendships (Schaefer et al., 2011) are beneficial to promoting achievement. This study examines types of activities, parent involvement, and friendship quality on grades. We used the National Longitudinal Study of Adolescent to Adult Health (ADD Health; Harris & Udry, 2014). Results showed that higher parent involvement is associated with structured activities ($\beta = .22$, $p < .05$) and, in turn, structured activities are associated with higher grades ($\beta = .06$, $p < .05$). Next, we investigated specific types of structured activities (e.g., sports). We found gender differences for the relation between friends and sports; for females, involvement in sports is not associated with quality of friendships, but for males, the more you are involved with sports, the higher quality your friendships. In addition, male friendship quality is significantly associated with sports participation ($\beta = .10$, $p < .05$), which is associated with higher grades ($\beta = .08$, $p < .05$). This makes sense given that most school sports teams are one gender, so they would foster those relationships. These results provide further evidence of the importance of friends and parents in different activities.

Evaluation of a Point-of-Care 4th Generation HIV-1/2 Assay

Camerin A. Rencken
Sponsor: Nam K. Tran, Ph.D.
Pathology & Laboratory Medicine
School of Medicine

Detecting acute HIV infection is critical for the management of the HIV epidemic. The acute phase associated with high viremia accounts for 15-20% of new infections, and has an estimated 28-fold increased risk of transmission compared to that of the chronic phase. The HIV-1/2 Determine (Alere, Inc) assay is a newly introduced point-of-care (POC) 4th generation rapid (20 minutes) test that detects p24 antigen and antibodies to HIV-1 group O and M and HIV-2. During seroconverision the p24 antigen increases and becomes detectable. Detecting p24 antigen enables early identification of acute HIV-1 superior antibody-based testing methods. We conducted a pilot study to evaluate the clinical sensitivity and specificity of the HIV-1/2 Determine assay compared laboratory methods (Architect HIV-1/2 Combo, Abbott Laboratories). Fifty-two remnant serum specimens were obtained for paired testing. The Determine assay's clinical sensitivity and specificity were both 100%, and there was no statistically significant difference when compared to the Architect HIV-1/2 Combo assay (P=0.074). In conclusion, the new POC assay was comparable to the laboratory method and could be used for early screening of patients with suspected HIV-1/2.

Design and Fabrication of Large-Scale Cell Stretching Device for Identifying Force-Sensitive Protein Complexes

Derrick J. Renner
Sponsor: Soichiro Yamada, Ph.D.
Biomedical Engineering

Many physiological processes, including wound-healing and tissue regeneration, require groups of cells to migrate collectively. During these processes, cells are constantly pushing and pulling against each other, yet they must remain adhered together and travel as a group. These mechanical forces influence the strength of adhesion between cells by regulating interactions between protein complexes. In order to characterize these force-sensitive protein complexes, we promote their formation at cell-cell junctions using a cell-stretcher, while labeling any force-sensitive proteins using our innovative biochemical analysis technique. The complete list of force-sensitive complexes will be identified using mass spectrometry, an approach that requires a large quantity of proteins. To meet this requirement, we will design and fabricate a large-scale cell-stretcher based on a flexible membrane. To ensure all cells experience equivalent strain in the new stretcher, we will perform a quantitative analysis of the strain distribution of the membrane substrate. Also, we will test how cells respond to different types of oscillatory strain by applying different strain patterns. This approach will help elucidate the molecular mechanisms underlying cellular response to mechanical forces.

Impact of Ocean Acidification and Warming on Behavior in Juvenile Antarctic Emerald Rockcod (*Trematomus bernacchii*)

Alexandra H. Resnick
Sponsor: Anne Todgham, Ph.D.
Animal Science

Research studies have shown significant alterations in fish behavior in response to increases in CO_2-acidified seawater (ocean acidification [OA]), such as predator-prey relationships, habitat selection, and anxiety. While most of these studies have focused on tropical and temperate fishes, none have characterized potential behavioral changes in polar fishes, or how behavior might be impacted by OA and the predicted increases in temperature (ocean warming [OW]). Here we investigate the effects of OA and OW on anxiety behaviors in the juvenile Antarctic emerald rockcod, *Trematomus bernacchii*. We exposed fish for 2 weeks to 3 predicted elevated pCO_2 scenarios at 2 temperatures; 420 (Ambient), 850 (Moderate) and 1250 uatm pCO_2 (High) at -1° or +2°C. After 2 weeks in each treatment, light/dark preference (scototaxis) was tested, with a dark zone representing a shelter for anxious fish. Anxiety was quantified through calculations of percent time in the dark zone versus the light zone, number of times the fish moved between zones, and frequency of high intensity surfacing-swim bursts within each zone. an understanding of how fish behavior may be affected by OA and OW will allow us to characterize how fish-environment and interspecific species interactions may be altered under future ocean conditions.

Nano-Topography Partially Mediates The Anti-Fibrotic Effect Of HSP90 Inhibition in Rabbit Corneal Stromal Cells

Eva J. Rewinski
Sponsor: Sara M. Thomasy, D.V.M.,Ph.D.
Surgical & Radiological Sciences
School of Veterinary Medicine

Transformation of quiescent keratocytes to contractile myofibroblasts is critical to corneal wound healing. Cytokines (e.g. transforming growth factor β1 (TGFβ1)) and biophysical stimuli (e.g. topography) in the cellular microenvironment mediate this transformation. However, prolonged residence of the myofibroblast phenotype in the cornea can result in stromal haze and fibrosis. Heat shock protein 90 (Hsp90), a chaperone protein, activates the TGFβ1 pathway. It was hypothesized that inhibition of Hsp90 will prevent the fibrotic phenotype of cells *in vitro*. Primary rabbit corneal fibroblasts (RCF) were cultured on topographically patterned substrates (planar, and 1400 nm pitch; pitch = ridge + groove width) in the presence and absence of 10 ng/ml TGFβ1 or 500 nM 17-(Allylamino)-17-demethoxygeldanamycin (17-AAG; an Hsp90 inhibitor). Protein and gene expression of relevant cellular phenotypic markers were analyzed using Western Blotting and qPCR. In addition, immunocytochemistry was used to visualize the protein distribution of treated cells. Here, TGFβ1 treatment promoted the myofibroblast phenotype while the 17AAG treatment facilitated keratocyte phenotype even in the presence of TGFβ1. This response was critically dependent on the dimensions of the underlying substrate. This data demonstrates that biophysical stimuli (topography) potently alter cellular responses to Hsp90 inhibition that are not always expected.

Human-Centered Interactive Design for Student Emotional Health and Creative Expression

Darin E. Reyes
Sponsor: Glenda Drew, M.A.
Design

US college students are in the midst of an invisible crisis. The emotional health of incoming freshman hit an all-time low in 2014, according to the Higher Education Research Institute at UCLA. Half of all college students experience "overwhelming anxiety", according to the American College Health Association. Each year, 1100 students take their own lives. Recent human-centered initiatives have shown that design can improve the lives of those struggling with anxiety, depression, and suicidal ideation. At my project's conception, I asked "How might I use interactive design to improve the lives of emotionally struggling students?". In response, I am developing an app for musical expression through human-centered research and an iterative design process. With the app, students will be able to express themselves and externalize experiences spontaneously and effortlessly. They will be able to improvise soundscapes individually or collaboratively, regardless of their musical experience. My project is based on new explorations of interface design, concepts from music therapy, and emerging theories on design for meaningful experiences. By involving my target audience in each step of the design process, I will find ways to effectively put the opportunity for new, cathartic and collaborative experiences in the hands and smartphones of students.

Toxin-Mediated Inhibiton of Neutrophil Recruitment to Infected Areas Represents a Major Immune Evasion Strategy in *Staphylococcus aureus*

Mack B. Reynolds
Sponsor: Scott I. Simon, Ph.D.
Biomedical Engineering

Skin and soft tissue infections, particularly those caused by virulent strains of the bacterium *Staphylococcus aureus*, have grown more prevalent in recent decades and are especially common in developed countries. The acquisition of antibiotic resistance by some of the most virulent strains, including methicillin resistant *S. aureus* (MRSA), complicates treatment. The normal clearance of *S. aureus* infection depends on the antimicrobial activity of neutrophils, a class of innate immune cells key for defense against extracellular bacteria. However, virulent strains of *S. aureus* manage to evade this neutrophil-mediated response to infection in a process that is still poorly understood. To address this, we have studied how bacterial burden, concentration of soluble toxin and neutrophil accumulation relate and define the timeline of infection. Using a transgenic mouse model, which allows fluorescently labeled neutrophils to be tracked, we compare neutrophil migration to wound sites inoculated with *S. aureus* strains that express or do not express alpha-hemolysin (HLA), a *Staphylococcal* toxin known to be a key determinant of virulence. We have found that increases in HLA concentration correlate with a decrease in neutrophil accumulation and delayed bacterial clearance. We propose that soluble toxins produced by *S. aureus* selectively inhibit neutrophil migration into infected areas.

The Role of Oxytocin in a Rodent Model of Diet-Induced Obesity

Maya A. Rhine
Sponsor: Karen Bales, Ph.D.
Psychology

Obesity is an on-going, world-wide epidemic that increases risk for various comorbid diseases including type 2 diabetes. This study will test the effects of oxytocin on diet-induced obesity in prairie voles. Oxytocin, a naturally-produced hormone, plays a large role in social bonding and reduces food intake in mice and humans. Additionally, prairie voles are monogamous rodents, and thus can provide insight on social effects of feeding behavior. The study will have two phases in which body weight and food consumption will be measured throughout. The first phase will determine the dose of intranasal oxytocin that most effectively reduces weight gain and feeding. Six male voles will be fed a high-fat diet for four months. Afterwards, they will receive varying doses of oxytocin or saline. The second phase will examine oxytocin and social effects on feeding. Twenty-four male and 24 female voles will be pair-housed and assigned to one of three diet conditions: both high-fat, both low-fat, or one high-fat and one low-fat. After four months, intranasal oxytocin will be administered. Social effects will be determined by examining differences across conditions. It is our hope that this study will inform further research into the social effects of oxytocin on obesity.

Uncovering the Trans-Membrane Protein, SAMP-1's Role in Meiotic Chromosome Segregation in *C. elegans* Males

Cassandra R. Rios
Sponsor: JoAnne Engebrecht, Ph.D.
Molecular & Cellular Biology

Spindle associated membrane protein, SAMP-1, is an integral nuclear membrane protein required for proper centrosome positioning in mammals. In *Caenorhabditis elegans* males, SAMP-1 undergoes dynamic localization during meiosis: it is associated with the nuclear membrane early and then moves to the nucleoplasm before being loaded between paired chromosomes. Depletion of SAMP-1 affects spindle polarity establishment and results in male sterility. I tested the hypotheses that 1) SAMP-1 translocates to the nucleoplasm through the nucleolus; and 2) *samp-1* mutants form multipolar spindles with acentriolar poles. For hypothesis 1, I used immunocytochemistry to determine if SAMP-1 co-localized with FIB-1, a nucleolar marker. The results of the double staining with SAMP-1 and FIB-1 showed complete overlapping, therefore supporting hypothesis 1. To begin to elucidate the significance of SAMP-1 nucleoli localization, I will determine if disruption of ribosome biogenesis in the nucleolus affects SAMP-1 localization and function. To address the second hypothesis I am using *samp-1* RNAi on a strain that has a fluorescently tagged centriolar marker (SAS-4) that allows visualization of centrioles within the multipolar spindles. Together, the results of my experiments will provide insight into the role of SAMP-1 in meiosis and why its absence results in male sterility.

Fuchs' Endothelial Corneal Dystrophy *In Vitro* Research Model: To Be or Not to Be?

Amanda M. Robinson
Sponsor: Sara M. Thomasy, D.V.M.,Ph.D.
Surgical & Radiological Sciences
School of Veterinary Medicine

A typical healthy corneal endothelium is characterized by a monolayer of polygonal cells, tight cell-cell junctions containing ZO-1 protein (to prevent free molecular movement across the endothelium), and high Na+/K+-ATPase expression (to dehydrate the cornea for visual clarity). Fuchs' Endothelial Corneal Dystrophy (FECD) has a non-uniform monolayer due to an irregular extracellular matrix and premature cell death, loss of tight cell-cell junctions, and increased Na+/K+-ATPase expression. Immortalized cell lines of both healthy (HCEC) and FECD cells (FCEC) have been utilized as *in vitro* models to study corneal disease. Immunocytochemistry of corneal endothelial biomarkers revealed poor localization of ZO-1 and undetectable Na+/K+-ATPase in both cell lines. Further characterization through Western blotting and quantitative real-time polymerase chain reaction (qPCR) analyses revealed low expression of these biomarkers as well as other proteins critical to normal cell function, e.g. GAPDH. Additionally, cells cultured to confluence *in vitro* did not form cell-cell junctions or a polygonal monolayer. The low expression and uncharacteristic localization of corneal endothelial biomarkers and critical proteins coupled with the abnormal morphology indicate the HCEC and FCEC lines are a poor *in vitro* model for FECD research.

DNA Library For Transgenic Marker Lines of Tomato and Wild Relative

Alan Rodriguez
Sponsor: Siobhan M. Brady, Ph.D.
Plant Biology

Global climate change has lead to increased extreme precipitation patterns that are affecting agricultural practices. In order to ensure optimal agricultural production, it is crucial to understand the biological processes within plants that respond to these extremes, namely drought and flooding. In order to track how tomato roots respond to drought and flooding, we have generated a marker line atlas in both cultivated *Solanum lycopersicum* and drought-tolerant *S. pennellii*. In each marker line, a root cell type-specific promoter drives expression of a nuclear envelope or a ribosomal tag. These marker genes were inserted into our tomato plants using *Agrobacterium*. Firstly, I have characterized the expression patterns of the cell type-specific promoters in our marker lines. Secondly, in order to create a true breeding homozygous population of each transgenic marker line, I have been creating T-DNA insert sequencing libraries to locate where in the genome of the transgenic tomato the genetic sequence containing our GFP+cell type-specific promoter has been inserted. With this, PCR can be used to quickly identify which progeny are homozygous dominant and thus create a homozygous population of transgenic tomato plants. These marker lines are being used in characterizing cell type-specific gene expression patterns.

Seeing Parts

Fabian Rodriguez
Sponsor: Allison Coudert, Ph.D.
Religious Studies

The purpose of this essay is to reveal modern science's rejection of holistic views which are instead replaced with a process of understanding that involves the breaking down things into their constitutive parts. In order to exemplify this point, blood will be examined through a blood test center setting, where the essay will place careful attention to how blood is separated into red blood cells, white blood cells, platelets, and plasma. In addition, food will also be examined, but within food engineering setting that will bring into light the deconstruction of food into nutrients. Both of these breakdown processes expose a shift away from cultural, religious and historical meanings of both objects, especially when considering the creation of the following categories: blood types and the food pyramid. These categories go on to encourage the individual to view blood and food in relation to a mechanical understanding of the human body that ultimately points to the reductionist tendencies that exist within science.

LAT1 and the Development of Sarcopenia

Javier Rodriguez
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

In response to cellular signals, transporters translocate from intracellular membranes to the plasma membrane to increase nutrient uptake. The trafficking of amino acid transporters has not been extensively studied. Among amino acid transporters, member 5 of the solute carrier family 7 (L-type amino acid transporter-1;SLC7a5/LAT1) is of particular interest since it is the primary leucine (a key anabolic amino acid) transporter in muscle. LAT1 decreases in abundance and expression with age, but it is uncertain whether the subcellular distribution of LAT1 changes as well. A shift in the distribution of the reduced LAT1 protein could further reduce the rate of leucine uptake and drive muscle loss. Our hypothesis is that LAT1 decreases in abundance at the plasma membrane with age due to reduced translocation from intracellular vesicles; resulting in anabolic resistance. A subcellular fractionation procedure was used to separate the plasma and intracellular membranes of rat skeletal muscle exposed to acute mechanical load. To verify the procedure properly separated cellular components, Na,K-ATPase, SERCA2, and GLUT4 levels were measured using western blot analysis. These markers showed the protocol effectively separated the different membrane components. Results suggest that LAT1 is an intracellular transporter, contrary to the established model.

The Economics of Recent Generational Conflict in the U.S.: Examining the Growth in Age-Based Wage Inequality Through a Supply and Demand Framework

Nicholas J. Rogness
Sponsor: Giovanni Peri, Ph.D.
Economics

Ballooning student debt and a tepid job market has fueled a heightened sense of economic anxiety among younger Americans. Meanwhile, older Americans—most of which form the baby-boomer generation—have aroused disdain for the greater economic opportunities they seem to have enjoyed throughout their life-cycle. Indeed, a likely consequence of these disparities in opportunity has been an observed increase in age-based wage inequality; in 1976, the average worker aged 55–64 commanded approximately the same hourly wage as the average young worker aged 25–34—by 2015, the older worker now earns more than 30% in hourly wages than its younger counterpart. Using a modified SDI (supply, demand, and institutions) framework based on previous literature on the college wage premium, I compute changes in old-young relative labor supply and relative labor demand over the 1976-2015 period to account for this growth in age-based wage inequality. My analysis reveals that higher growth in old-young relative labor demand contributed significantly to the growth in age-based wage inequality despite the growth in old-young relative labor supply. I further examine plausible macroeconomic contributors to this strong age-based relative demand with a more extensive analysis of the effects of skills-biased technological change and differential declines in unionization.

Structural Coalescence of $Fe_{25}Ni_{25}Co_{25}Al_{10}Ti_{15}$ High-Entropy Alloy Processed Through Mechanical Alloying

Lino Romero
Sponsor: Enrique J. Lavernia, Ph.D.
Chemical Engineering & Materials Science

High_entropy alloys can offer superior mechanical and corrosive performance when compared to traditional alloys with less than five principal elements. In an effort to further develop a comprehensive approach to their design, the $Fe_{25}Ni_{25}Co_{25}Al_{10}Ti_{15}$ high-entropy system is investigated with the aim of describing its formation when processed through solid state mixing using high-energy ball milling. In order to determine the elemental alloying sequence, samples of the alloy were prepared from pure (>99.5%) elemental powders, and processed for different periods of time followed by characterization using x-ray diffraction. Ultimately, strain in the forming lattice reduced x-ray diffraction intensities but provided some qualitative insight into the amorphization of the developing crystal structure. The alloying sequence was inconclusive. However, strain imparted by the alloying process amorphized the solid mixture where it appears that the enthalpy of formation for a single phase is favored above the formation of several intermetallic phases. These results suggest that characterization of these alloys would benefit from the use of line or area_scanning detector equipped x-ray diffractometers, and that other processing routes may provide more quantitative results.

Changes Over Time of Nitrogen Sources in Forest Ecosystems: Examining $\delta^{15}N$ of Tree Cores

Athina Ruangkanit
Sponsor: Benjamin Z. Houlton, Ph.D.
Land, Air & Water Resources

Nitrogen is one of the most limiting nutrients in forest ecosystems. Current models of nitrogen cycling often focus on atmospheric nitrogen entering terrestrial ecosystems. However, recent research has indicated that nitrogen from geologic sources may also play an important role in tree growth. In our study, we will collect tree cores, soil and rocks from sites on which *Pseudotsuga menziesii*, commonly known as Douglas firs, are dominant. This species was chosen due to its ability to send roots deep into the soil, penetrating bedrock. We will use $\delta^{15}N$ isotope analysis to compare the trees' nitrogen sources during different stages of their growth. We expect to see a shift from atmospheric nitrogen to $\delta^{15}N$ as the trees grow larger and their roots are able to penetrate the bedrock beneath them. The rocks and soil collected will undergo $\delta^{15}N/^{13}C$ analysis in order to determine the amount of $\delta^{15}N$ available to the trees across the different sites. The findings of this project could lead to a better understanding of the role of geologic nitrogen in plant growth.

Elephant-Initiated Interactions With Humans: Individual Differences and Specific Preferences

Zoë T. Rossman
Sponsor: Lynette Hart, Ph.D.
Population Health & Reproduction
School of Veterinary Medicine

South Africa has seen a recent increase in the number of African elephants (*Loxodonta africana*) maintained in reserves and parks and managed in free contact, where they may spend a significant amount of time in close proximity to humans. This study investigates how individual elephants choose to initiate interactions with humans by looking at whether interaction types and frequencies vary both between elephants and with regards to the category of human involved in the interaction. Observations were made on a herd of seven African elephants frequently exposed to elephant handlers (guides), volunteers (who carry out general observations for the park's research unit), and tourists. As a group, the elephants differed in the frequencies that they initiated interactions with each category of human, and interacted most frequently with guides. Individual elephants showed preferences in interacting with specific guides, indicating particular elephant-guide bonds. Certain elephants initiated more interactions overall, and differed in the types of behaviors they used to initiate interactions. This study provides evidence for elephant-handler bonds as well as information on the extent of interactions between humans and African elephants managed in free contact.

Moderators of Sugary Beverage Consumption Among College Students

Elizabeth A. Ruano
Sponsor: Lisa S. Miller, Ph.D.
Human Ecology

College student consumption of sugary beverages is high. Research has shown a relationship between consuming sugary beverages and eating at fast food restaurants, as well as a relationship between nutrition knowledge and dietary quality. We examined the role of nutrition knowledge as a possible moderator of the relationship between sugary beverage intake and eating out at fast food restaurants. Participants (n=57) completed a battery of tests that assessed their nutrition knowledge, eating away from home behaviors, and dietary intake. Findings showed that eating out at fast food restaurants and sugary beverage consumption was moderated by knowledge. Specifically, an association between sugary beverage intake and fast food eating was evident for low knowledge in college students. However, college students with high knowledge showed no relationship indicating that knowledge is important in navigating sugary beverage choices in fast food restaurants among college students. These results may help to shed light on how to promote healthier eating habits in college students.

Sustainable Drinking Water Treatment in Atopolitlan, a Small Rural Town in Mexico

Alejandra Ruiz
Sponsor: Jeannie Darby, Ph.D.
Civil & Environmental Engineering

Although there have been many advancements in the water treatment industry, there are about 780 million people that do not have access to safe drinking water. Many people affected by waterborne illnesses lack economic resources and live in developing countries, such as the citizens of Atopoltitlan, Mexico. Atopoltitlan is a rural community that has been facing an increase in waterborne diseases, specifically diarrhea. The objective of this investigation is to evaluate the current non-potable water source of Atopoltitlan and propose a solution to obtain potable water that is both sustainable and economical. An assessment trip will be made in order to collect and analyze water samples. The samples will be analyzed using standard method procedures that include the Membrane Filter Technique, and the Hach PathoScreen field test, which detects hydrogen sulfide producing bacteria such as salmonella. A comparison of various sustainable options, such as slow intermittent filter or solar disinfection, will be discussed and used to recommend the best water treatment method for Atopoltitlan. The proposal may also serve as a template for other rural towns in developing countries with similar circumstances.

State Sanctioned Attitudes and Actions: Prejudice and Violence Against the Lesbian, Gay, Bisexual, and Transgender People of Russia

Yaquelin Ruiz
Sponsor: Amber Boydstun, Ph.D.
Political Science

Increasingly, countries around the world are becoming more tolerant of minorities, particularly the lesbian, gay, bisexual, and transgender community. However, as some countries become more accepting, the developed country of Russia has taken steps to alienate this segment of their population. What has caused a shift not only in attitudes but also in actions toward the LGBT community in Russia? By collecting and examining original datasets, I present several interacting features that illustrate that there has been an increase in not only interest but also negative opinion in the LGBT community. And, due to the state's actions and the media's negative representation of LGBT topics, this negative opinion has translated into increased violence for the LGBT people of Russia. This work is significant as it brings attention to the need for distinct data on minorities around the world and it illustrates the interacting forces that have created a negative situation for the LGBT people of Russia.

Reconstitution of Recombinant Chromatin With Introduced Acetyl-Mimetic Mutation

Maggy Ryan
Sponsor: Stephen C. Kowalczykowski, Ph.D.
Microbiology & Molecular Genetics

Histones are responsible for organizing DNA into nucleosomes and are the most abundant proteins in chromatin which compose chromosomes. Chromatin can be remodeled to either expose or occlude genomic DNA, and deviations in chromatin remodeling can lead to cancer. An increase in levels of H2A.Z acetylation, the addition of an extra acetyl functional group, has been found to have a correlation with breast cancer severity. My project focuses on H2A.Z acetylation regulation. I introduced mutations to imitate the acetylation of H2A.Z on the N-terminal tail using PCR site-directed mutagenesis. I am currently working on recombinant histone octamers production and the reconstitution of chromatin from both recombinant histone octamers and recombinant DNA. The ending goal is to gain deeper understanding of chromatin remodeling within the context of histone acetylation. The remodeled chromatin will be used to perform chromatin remodeling assays on a single molecule level in the Kowalczykowski lab.

The Evolution of Female-Limited Color Dimorphism in the *Drosophila montium* Group

Gayane Saakyan
Sponsor: Artyom Kopp, Ph.D.
Evolution & Ecology

Female-limited color dimorphism (FLCD) is a phenomenon in *Drosophila serrata* where females have light or dark abdomens, but males have only light abdomens. In this species, the dark allele is dominant, but masked in males suggesting presence of sex-specific color regulation. However, other closely related species lack FLCD, indicating that the dark allele may be novel in *D. serrata*. Research from the Kopp lab suggests that female abdominal color in *D. serrata* is controlled by a *cis*-regulatory element (CRE) in the transcription factor, *pdm3*, which represses pigmentation. To study the evolution of the dark allele, I will investigate the expression of orthologous *pdm3* CREs from *D. bunnanda* and *D. birchii*, where both sexes are light. I will clone the CREs into a vector that produces green fluorescent protein (GFP) and transform *D. melanogaster*. I will compare their GFP expression patterns to those produced by light and dark *D. serrata* alleles. I expect the CRE-containing region from these species that lack FLCD to express more GFP compared to the dark *D. serrata* allele. My analysis will identify expression and sequence changes in the *pdm3* CRE associated with female abdominal color and help us understand how the gene *pdm3* contributes to FLCD.

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Jean Abigail H. Saavedra
Sponsor: Nolan Zane, Ph.D.
Psychology

Traditional psychotherapy was originally designed for middle and upper class Westerners, but is our contemporary mental health system adequate enough to serve people of diverse backgrounds? Research shows that certain groups underutilize mental health services: Asian Americans underutilize mental health care relative to White Americans (Matsuoka, Breaux, & Ryujin, 1997); low socioeconomic status (SES) is linked to higher drop-out rates from therapy (Barrett et al., 2008); and men seek help for health problems less often than women (Möller-Leimkühler, 2002). The effectiveness of psychotherapy may be dependent on or facilitated by client self-disclosure; therefore, the aforementioned disparities may be due in-part to differences in one's willingness to disclose personal information to another individual. This study examines ethnic, gender, and SES differences in self-disclosure patterns among Asian American and White college students (N=366). Our findings indicate that Asian Americans, males, and those of low SES disclose less distress and are less likely to disclose personal information to a friend than Whites, females, and those of high SES, respectively. These findings suggest that traditional psychotherapy might not be seen as valid or culturally relevant to people of diverse backgrounds, and enhancing client self-disclosure may require additional cultural competency training in therapeutic practice.

Validation of Cardiac Slices as an Experimental Model

Courtney M. Saeteurn
Sponsor: Julie Bossuyt, D.V.M.,Ph.D.
Pharmacology
School of Medicine

Live tissue slices are well-established models for research into organ (patho)physiology, particularly for brain and liver. In cardiac research, tissue slices have received less attention even though they possess a theoretical advantage over isolated myocyte studies in maintaining the innate 3D cardiac structure and physiological cell-cell connections. Cardiac slices are becoming increasingly popular but this approach poses numerous technical challenges. Our goal here was to establish experimental conditions to obtain consistent, vital tissue slices from mouse heart of uniform thickness and with minimal tissue damage. We optimized cardiac slice preparation by varying cardioplege conditions (e.g. electromechanical uncoupling), vibratome sectioning thickness (150–400 µm), embedding in low-melting agarose (1-4 %) and plane of cut (epicardium-tangential vs. transverse). The structural integrity, viability and function of the slices were then followed over several days. Our data show that following optimization, cardiac tissue slices are indeed a promising tool for electrophysiological, imaging, and pharmacological studies.

Transforming la Comunidad: The Impact of Community-Based Participatory Research in Central California

Kenya C. Salazar-Campos
Sponsor: Yvette G. Flores, Ph.D.
Chicana & Chicano Studies

Niños Sanos, Familia Sana (NSFS) is an interdisciplinary childhood obesity research study in the communities of Firebaugh and San Joaquin, located in Central California. In San Joaquin, the comparison community, the goal is to help parents advocate for their children's education and promote Family wellbeing. Through a community-based participatory research (CBPR) approach, the research team developed workshops and other community activities to engage study participants in the comparison community. The purpose of the workshops is to use CBPR to address disparities identified by community members. The workshops were developed by gathering data through focus groups with the purpose to empower community members to get involved and advocate for-changes that would benefit everyone in the community. This study presents methods of the development of the workshops, workshop evaluations and community feedback. CBPR has demonstrated to have a positive effect in San Joaquin communities to the degree that new projects have arise within the community members. Implications for the future research include community-based approaches for the development of workshops that address disparities within the Mexican-Origin community.

The Susceptibility to Injury Due to Age-Associated Differences in Cytoskeletal Proteins

Perrie M. Saleh
Sponsor: Keith Baar, Ph.D.
Neurobiology, Physiology & Behavior

Loss of muscle strength due to aging is associated with a loss of force transmission. The purpose of this study was to determine the physiological implications of a loss in dystrophin levels in the EDL muscle with age. Specifically, we determined whether an age-associated decrease in dystrophin caused an increase in contraction induced muscle injury. To determine susceptibility for muscle injury with aging, EDL muscles experienced 60 high force-lengthening contractions over a 20-minute period. The percentage of injured fibers in both the stimulated and control muscles was determined 48 hours following the stimulation using immunohistochemical detection of IgG positive cells. Consistent with our hypothesis EDL muscles from older animals demonstrated a 4-fold increase in injured fibers, whereas the EDL muscles from adult animals show no change in IgG positive cells. Overall, the data indicates that even before any changes in muscle mass, age-dependent changes in the proteins involved in force transfer make muscles more susceptible to contraction-induced injury.

Parental Coping/Stress, Adolescent Emotion Suppression and Their Effects on Adolescent Anxiety

Rangeena Salim
Sponsor: Amanda E. Guyer, Ph.D.
Human Ecology

Previous research finds that the suppression of emotional expression as an emotion regulation strategy is predictive of multiple psychopathologies, including anxiety disorders (Aldao et al., 2010). In this cross-sectional study, we examined how mother's ability to cope with stress and their adolescent daughters' degree of emotion suppression predicted anxiety severity in these girls at age 16 years (n=175). We conducted a multiple regression analysis to test the effects of maternal coping and adolescent emotion suppression on adolescents' anxiety severity, controlling for race (i.e. Caucasian, African American, Asian, Other), IQ (M=95), and receipt of public assistance. Neither parent coping (p=.20) nor the interaction between maternal coping and adolescent emotion suppression (p=.96) were significant in predicting adolescent anxiety. However, there was a significant effect of adolescent emotion suppression on anxiety ($F(6, 168) = 2.42$; $p < .03$; $R^2 = .08$). These results indicate that emotion suppression predicts anxiety at age 16 in girls, a finding that demonstrates the potential harmful effects of ineffective emotion regulation strategies in adolescent girls.

Looking for the Perfect Beat: Hip-Hop Culture in the Middle East

Estevan M. Sanchez
Sponsor: Magid Shihade, Ph.D.
Middle East/South Asia Studies

Hip-Hop culture through its four elements, Graffiti, Rapping, Break Dancing, and Deejaying has become an outlet for youth to organize politically and express their thoughts in the Middle East. This research showcases the complexity of Hip-Hop culture by incorporating interviews, news articles, and original works. In order to understand how a cultural movement which started in the US has become global, Halifu Osumare's book *The Africanist Aesthetic in Global Hip-Hop: Power Moves* is used. The theoretical approach from the *The Africanist Aesthetic* is comprised of three connective marginalities which explain the global spread of Hip-Hop culture in their given contexts. Deejaying and sampling are understudied areas of Hip-Hop culture in the US, but deserve much attention as they are the backbone of Hip-Hop. This work aims to expand Joseph Schloss' *Making Beats: The Art of Sample Based Hip Hop* to the international level as sampling in the Middle East has become an important component of Hip-Hop culture. By combining original resources, theoretical approaches, and previous work done on the topic, this research aims to expand the understanding of Hip-Hop culture in the Middle East.

Effect of Donor Age on Extracellular Matrix Structure-Function Properties in Xenogeneic Scaffold Generation

Kimberley C. Sannajust
Sponsor: Leigh Griffiths, D.V.M.,Ph.D.
Medicine & Epidemiology
School of Veterinary Medicine

Development of xenogeneic tissue scaffolds present a potential solution for patients requiring lifelong small diameter-vascular grafts. As structure-function properties are critical in functional tissue engineering applications, age-associated differences in xenogeneic tissue composition and mechanical properties may be important factors to consider when selecting a source tissue. Extracellular matrix (ECM) composition, thermal stability and tensile properties of adult and calf bovine carotid artery were assessed (n=3 per group) to identify whether age-dependent differences in vascular tissue exist. Carotid collagen content of adult samples were significantly greater than that of calf samples, while carotid GAG content of adult samples were significantly less than that found in calf samples. Elastin content, denaturation temperature and elastic modulus did not yield significant differences between adult and calf carotid samples. As these studies were only preliminarily performed at a pilot scale, a larger sample size may be necessary to achieve sufficient power for statistical analysis. Nonetheless, the known interplay between tissue structure and function suggests that the age-based differences observed in carotid ECM composition are likely to result in differences in carotid ECM function.

Hop1 Site-Directed Mutagenesis

Sneha Santosh
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Small Ubiquitin-like Modifier (SUMO), is a post translational modification involved in regulating a number of cellular processes including DNA damage repair and stress responses. More recently, SUMO has been shown to be important in meiosis for protein regulation and cellular signaling. Budding yeast Hop1 is a vital meiotic checkpoint protein component of the synaptonemal complex with roles in recombination, chromosomal synapsis and checkpoint signaling. Mass spectrometry analysis from Hunter Lab confirms that this protein is SUMOylated at 13 lysine residues. In this study, we will use site-directed mutagenesis to mutate all 13 sites and change the lysines to arginines. We are making point mutants of Hop1 that can no longer be SUMOylated while maintaining the other functions of the protein. We will then study the effect of this on meiosis by analyzing spore viability, recombination, and the timing and efficiency of meiotic divisions. This will help us determine if Hop1 SUMOylation is necessary for proper meiotic recombination.

Effects of Soil Conditions on the Adaptive Anatomical Characteristics of the Adventitious Roots of Tomatoes

Reina Marie Sanz
Sponsor: Siobhan M. Brady, Ph.D.
Plant Biology

Advancing into the century, crop yield is threatened by the predicted rise in both drought and flooding. By examining the roots, we can identify adaptations that enable crops to prosper despite soil conditions. The adventitious roots of tomatoes exist near the surface of the soil, developing from the stem and hypocotyl of the plant. The anatomical characteristics of these roots vary depending on its environmental conditions. We have determined how the water content of the soil affects the anatomy of the root. I sectioned and imaged adventitious roots from groups of tomato plants with distinct soil conditions (14 days of control, drought, or waterlogging). I analyzed the cross sectional images using ImageJ for the areas of the vascular and nonvascular tissues. The percentage of nonvascular area in adventitious root sections was significantly higher in waterlogged roots compared to the control ($p=0.0028$). I also showed that this increase in non-vascular area is due to an increase in the number of cortex layers in the adventitious roots from waterlogging treatment compared to control ($p=0.003$). I propose that tomato plants develop more cortex layers in response to waterlogging stress to allow more oxygen to flow through its adventitious roots.

Self-Ubiquitination of Ube3a Protein

Koki Sasagawa
Sponsor: David J. Segal, Ph.D.
Biochemistry & Molecular Medicine
School of Medicine

Ube3A is a E3 ubiquitin-protein ligase which is responsible for tagging proteins for degradation by the proteasome. Ube3a interacts with Human Papilloma virus to cause cervical cancer. Absence of Ube3a causes the neurodevelopmental disorder Angelman's Syndrome. In an unpublished study, a Ube3a immunoprecipitation pulldown was incubated over a time series and then was run on a Western. This showed a compelling data: The natural size of Ube3a is around 100kD, however the data showed an increase to 200kD over the time course. We speculated this increase to be due to protein self-ubiquitination. A further observation made in a preliminary study done at the Segal lab showed that in Prader-Willi Syndrome Mice, the Ube3A protein appear to be around 200 kD from nuclear lysates, but only 100kD from the cytosol. Ube3a itself contains multiple ubiquitination sites, thus the ubiquitin attached to the protein may be responsible for this size increase. To test this hypothesis, we will use a deubiquitinating enzyme to remove any ubiquitin on Ube3a and determining size via western blot analysis. If correct, we would expect the protein to fall back to its natural size.

3-D Hypoxic Characterization of OECs and Homing Towards Sphingosine-1-Phostphate *In Vitro*

Chaithra Sathisan
Sponsor: Eduardo Silva, Ph.D.
Biomedical Engineering

Therapeutic angiogenesis relies on delivering angiogenic factors such as vascular endothelial growth factor (VEGF) and sphingosine-1-phostphate (S1P) to induce neovessel formation, and reverse tissue ischemia. Naturally, ischemic conditions trigger recruitment of endothelial progenitor cells (EPCs) and especially outgrowth endothelial cells (OECs), a subset of EPCs, to the site of direly needed neovessel formation. Under ischemic conditions, growth factors and migratory signals are upregulated to recruit OECs. New research in tissue engineering aims to augment this natural healing process by delivering factors that can enhance the degree of homing and subsequent neovascularization/healing. Hence, there is a strong need for more intricate *in vitro* assays and techniques that allow for studies to better understand how the delivery of these factors may be optimized for maximum homing. The first objective of this study is to characterize OECs isolated from different umbilical cord blood donors in a 3-D hypoxic environment. Subsequently, this work aims to design a novel *in vitro* assay that provides capability to analyze OEC homing towards S1P (and/or other mobilizing factors) and possible incorporation within a mature microvascular network. This work will elucidate crucial information about OEC homing for use as a tool in therapeutic angiogenesis.

Importance of the L-ornithine Importer PuuP to the Intracellular Survival of *Brucella abortus*

Nada Sayed
Sponsor: Renee Tsolis, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Brucella abortus is a zoonotic parasitic bacterium that causes premature abortion of cattle fetuses and several diseases in humans. The bacterium replicates intracellularly inside macrophages by using amino acids to satisfy its appetite for nitrogen. Additionally, it is known that *Brucella*-infected macrophages belong to a specific class of macrophages that show elevated levels of L-arginine derivatives. However, it is unknown what particular L-arginine derivatives are important to maintaining its lifestyle. Here, we investigate the contribution of the L-arginine derivative L-ornithine to the intracellular replication of *B. abortus* by constructing a *B. abortus* 2308 strain lacking the gene for the L-ornithine importer PuuP. To obtain an unmarked deletion of the puuP gene we used PCR to amplify the two homologous regions that surround the puuP gene and then we cloned the fragments via Gibson Assembly into the *Brucella* suicide vector pRDH10. The resulting plasmid pRDH10-puuP was transformed into *E. coli* S17-1 λpir to conjugate into *B. abortus*. Then we obtained chloramphenicol-resistant *B. abortus* clones and finally we counter-selected for sucrose-resistant but chloramphenicol-sensitive mutants on sucrose plates. These findings have new implications in defining the replicative niche of *Brucella* inside mammals and subsequently can be useful in developing treatments for brucellosis.

Surface Modification by Polyester Fibers by Thermal-Induced Radical Graft Polymerization

Helen Schulz
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Synthetic fibers, unlike natural ones, do not have the desired comfort and application properties. Surface modification of poly (ethylene terephthalate) (PET) fibers has been an important and effective method to improve and/or introduce new functionalities to the fibers. Radical graft polymerization has for the potential to chemically modify surfaces of fibers like PET. In this research peroxide radical initiators are used for generation of polymeric radicals on surfaces of PET fibers, which can lead to surface graft polymerization of functional monomers. A reaction system that promotes the accessibility of the initiator radicals to the CH_2 groups on PET surfaces and abstract H-atom to generate reactive radical sites is designed. Conditions and parameters that can potentially assist controlling the radical graft polymerization and enhancing the grafting yield on the PET surface are studied such as, addition of different swelling solvents, initiators and monomer structures. Fourier transform infrared spectroscopy (FTIR) is used to characterize the grafted PET samples. Iodometry titration and thermogravimetric analysis are conducted to measure properties of the grafted fibers.

R-Loop Footprinting for Human Genes

Tommer Schwarz
Sponsor: Frédéric L. Chédin, Ph.D.
Molecular & Cellular Biology

R-loops are DNA-RNA hybrid structures that can form during transcription in mammalian genomes. Recent data from the Chédin lab shows that R-loop formation is prevalent in these genomes and participates in important biological processes. It is therefore important to develop new methodologies to characterize the structures of R-loops using high-throughput DNA sequencing data. To accomplish this, I created a Python computer script that parses out the output of the Bismark mapping software and determines R-loop initiation and termination sites and lengths, among other properties. From this, scientists can easily retrieve strand-specific information about R-loop structures at any sequenced gene. At this point, my tool has been used for footprinting R-loops on the human MYC and CALM3 genes. My final goal for the tool is to be able to accept sequence reads from any gene and output a complete, clear heatmap showing users information about the existing R-loops in the given gene.

Physiological Role of Brca2 During Meiotic Recombination

Samantha L. Schuster
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Homologous recombination occurs when a damaged chromosome uses complementary sequences on a second intact chromosome as a template for repair. BRCA2 mediates homologous recombination in both somatic and germ cells. In somatic cells, BRCA2 facilitates RAD51 loading onto DNA lesions; therefore, its absence leads to genomic instability. This study seeks to better define BRCA2's meiotic role. For the first time, we optimized BRCA2 immunostaining, revealing punctate foci specifically localized along SYCP3-staining chromosome axes. BRCA2 is detected throughout meiotic prophase, always in association with SYCP3. To further our understanding of BRCA2's meiotic role, we have conditionally mutated Brca2 in cells undergoing meiosis. Mice containing a floxed Brca2 allele were crossed with lines expressing Cre recombinase under meiosis specific promoters. Spermatocyte and oocyte chromosome spreads from age-matched mutant and control mice were used to analyze meiotic defects. Brca2 mutants showed a significant decrease in the normally synchronous progression of oogenesis and high levels of abnormal chromosome axes. Defects were also evident on histological sections of Brca2 mutant ovaries, which contained significantly lower levels of follicles. With these results, we conclude that functional BRCA2 is essential for successful axis formation, the progression of gametes through meiosis, and ovarian follicle formation.

Bremia lactucae Effector-Induced Suppression of Host RNA Silencing Pathways

Alyssa Schweickert
Sponsor: Richard W. Michelmore, Ph.D.
Plant Sciences

Bremia lactucae or Downy mildew is a pervasive oomycete pathogen that affects lettuce. *Bremia lactucae* promotes infection and pathogen proliferation by secreting virulence effector proteins that hijack the host's innate immune system. These effector proteins have the capacity to promote infection through suppression of host RNA silencing pathways. Host RNA silencing suppresses the expression and proliferation of *B. latucae* through cleavage of viral mRNA's. The RNA-silencing suppression abilities of seventy effector proteins will be tested using a silencing suppression assay. This assay entails utilizing host *N. benthamiana* and *L. sativa* that constitutively express Green Fluorescent protein (GFP). No observable green florescence is detected in GFP-expressing *N. benthamiana* and *L. sativa* as a result of host siRNA-mediated silencing. An effector's ability to effectively suppress host RNA silencing will be determined through *Agrobacterium* infiltration of each individual effector into the leaves of GFP-containing *N. benthamiana* and *L. sativa*. Strong fluorescence will be observed if the effector is capable of eliminating host siRNA-mediated silencing, enabling constitutive expression of the exogenous GFP in the leaves. Knowledge regarding effector-target interactions can be used to improve breeding strategies for lettuce to produce downy mildew resistant cultivars.

Endophytic Fungi of Two Californian Oaks

Grace M. Scott
Sponsor: David Rizzo, Ph.D.
Plant Pathology

Endophytic fungi occur in plant tissue without causing obvious negative effects and can be found in nearly all land plants. Leaves from Valley Oak (*Quercus lobata*) and Coast Live Oak (*Quercus agrifolia*) in Davis, CA were sampled to survey and compare the endophytic fungi present. Leaf samples were thoroughly surface sterilized to prevent contamination by epiphytic fungi or airborne spores and then plated on potato dextrose agar with antibiotics to examine growth. DNA was extracted from morphologically distinct cultures, and the ITS region of the ribosomal DNA was amplified and sequenced to determine the diversity of fungi within each type of oak leaf. Differences in the fungi present in each oak species could be a result of the asymmetry of their life cycles; Valley Oak is deciduous and the advent of senescence in November could account for some of the variety seen in the colonizing fungi, while the long lives of individual Coast Live Oak leaves might increase their colonization rate. Fungi will be morphologically characterized and sequences deposited in GenBank.

American Residences in the Round: The Ideologies of Round Homes Across Time

Iman Seale
Sponsor: Diana Strazdes, Ph.D.
Art & Art History

Over the past few centuries, the American home has experienced a plethora of stylistic changes. The block form has remained an underlying constant as the starting point for the home. From Colonial homes to bungalows, right angles and regular shapes were featured as part of the archetypal American residence design. However, there have been departures from this tradition. One of the most notable variations is the round house. Inspired by efficiency and aesthetic appeal, round houses opened up whole new avenues for the style of American homes. In this paper, I examine two distinct American round houses: the Armour-Stiner House of Irvington, NY and the Dome Home of Pensacola, FL. The purpose of this comparison is to discuss parallels in the style and functionality of the homes through an analysis of their locations, exteriors, and interiors. In doing so, it is evident that even the most idiosyncratic round homes have a common goal of challenging and improving upon the traditional block mode.

A Religion of Sensuous Desire: The Ritualization of Eroticism Within Marcel Duchamp's Étant donnés

Elizabeth G. Seeley
Sponsor: James Housefield, Ph.D.
Design

Marcel Duchamp's final artwork, Étant donnés (1946–1968) explores the liminal relationship between the subject and the viewer through an elaborate 3 dimensional tableau. Installed in the Philadelphia Museum of Art only after the artist's death, Étant donnés is a fitting summary of and conclusion to Marcel Duchamp's lifelong romance with erotic liminality. Only visible through two eye-level holes in an old wooden door, a nude female body lies splayed on a bed of twigs; one arm stiffly raises a gas lamp, illuminating the lush landscape behind her. The ritualized eroticism of Étant donnés allows for a disconcertingly penetrative liminality, forcing a reconsideration of the viewer's agency when visually consuming the work. Comparable to a religious altarpiece in both its physical cues and theoretical interpretation, my research explores the significance of Étant donnés as a liminal tool for transcendent spectacle that operates in much the same way Catholic ritual objects evoke their own transformative enlightenment. Focusing on the work's parallels to sacramental ritual and the accompanying objects within Catholicism, I relate the sensuality of eroticism within Étant donnés to the sensuality of ritual within the Catholic religion.

Computational Discovery of Differentially Expressed Genes and Inference of the Related Network in Antibiotic Treated *Escherichia coli*

Weston L. Selna
Sponsor: Ilias Tagkopoulos, Ph.D.
Computer Science

With the aid of computers and intelligent programming, biologists are now able to look at gene interactions across an organism's entire transcriptome. The organism *Escherichia coli* is the most studied bacteria in the world. *E. coli* is both a beneficial part of human gut microbiota, but additionally can cause illness when in our urinary tract or food. Infectious *E. coli* can be treated with antibiotics. The primary effects of these antibiotics are well known, however this study looks beyond to all interactions between genes in order to better understand how *E. coli* both react and adapt to antibiotic exposure. This study utilized data from the currently unpublished Ecomics database from our lab, which consists of over 4000 *E. coli* experiments, each with at least one associated -omic profile: transcriptomic, metabolomic, proteomic, and fluxomic. This study identifies a subset of differentially expressed genes in *E. coli* MG1655 under two antibiotic states, and infers a regulatory network among the genes using pairwise regression, multiple regression, and LASSO. This study aims to demonstrate a way to refine sets of differentially expressed genes, show the improved inferencing power and sophistication in the models, and how a robust network may exist among the genes identified.

Lipoprotein(a) is a Significant Predictor of Cardiovascular Risk in HIV-Infected Women

Mahnoor Shafi
Sponsor: Enkhmaa Byambaa, M.D.,Ph.D.
Internal Medicine
School of Medicine

Lipoproteins travel throughout the body delivering triglycerides, proteins, and cholesterol. Lipoprotein(a), Lp(a), is a type of plasma lipoprotein associated with an increased risk for cardiovascular disease, CVD. Copy number variations in the apolipoprotein(a) gene regulates levels of Lp(a) and though lipid-reducing drugs and lifestyle changes do not greatly affect Lp(a) levels, HIV infection may. The interplay between Lp(a) and HIV, however, is not well documented in literature. To address this issue, we assessed Lp(a) levels with carotid intima media thickness (cIMT), an early measure of plaque-buildup, in 150 HIV+ and 100 HIV- women as the test and control group respectively. There was a significant correlation between increasing cIMT and Lp(a) levels in the HIV+ group whereas this was not seen in the control. Even after multivariate adjustments for confounding variables (i.e age, race, BMI, blood pressure, smoking, lipids and lipoproteins, HIV treatment, CD4+ T-cell count, and HIV RNA viral load), the correlation remained significant. This indicates that elevated Lp(a) levels are indeed a significant predictor of cIMT in HIV infected women.

Association of HDL-C and LDL-C With Carotid Intima Media Thickness in HIV Positive Populations

Zannain Shafi
Sponsor: Enkhmaa Byambaa, M.D.,Ph.D.
Internal Medicine
School of Medicine

Lipoproteins transport cholesterol through out the body and there are several types with different ratios of cholesterol to protein. Elevated levels of low-density lipoprotein cholesterol (LDL-C) are associated with increased risk for cardiovascular disease (CVD), while high levels of high-density lipoprotein cholesterol (HDL-C) have been shown to protect against atherosclerotic CVD. Worldwide, approximately 38 million people have human immunodeficiency virus (HIV). With the advent of antiretroviral therapy (ART), HIV is a much more manageable disease today than it was back in the 1980's. Evidence suggests HIV infection and/or ART places patients at a significantly increased risk for CVD compared to the general population. HIV-induced changes in lipid/lipoprotein profiles may contribute to increased risk for CVD. To investigate whether LDL-C and/or HDL-C are predictors for CVD in HIV patients, we examined their relationship with measures of subclinical atherosclerosis [carotid intima media thickness (cIMT)] in 150 HIV+ and 100 HIV- control women. Neither LDL-C nor HDL-C was found to be predictive of increased cIMT measures in HIV+ women. Further research is needed to identify possible causes for the increased risk of CVD in HIV-infected populations.

Four Tyrosine Residues on the Rice Immune Receptor XA21 are Required for Interaction With Its Co-Receptor OsSERK2 *In Vitro* and Resistance to *Xoo*

Sweta Sharma
Sponsor: Pamela C. Ronald, Ph.D.
Plant Pathology

Rice is one of the most important crop plants and feeds half of the world's population. *Xanthomonas oryzae* pv. *Oryzae (Xoo)* causes bacterial leaf blight and leads to significant yield losses in affected rice fields throughout Asia. The rice immune receptor XA21 along with the co-receptor OsSERK2 recognizes *Xoo*, initiates an XA21-mediated immune response, and confers robust resistance to *Xoo*. Recent research has suggested that phosphorylation of tyrosine residues on plant immune receptors are important for their functionalities. To determine if tyrosine phosphorylation is important for XA21, graduate student Daniel Caddell mutated four tyrosine residues on XA21. He generated transgenic rice plants expressing XA21 carrying the selected tyrosine residues mutated to aspartic acid, which mimics a phosphorylated tyrosine. Mutant XA21 plants no longer conferred resistance to *Xoo*. To follow up, I performed a yeast 2-hybrid experiment, in which the XA21 tyrosine mutants lost their interaction with OsSERK2. Taken together, these results suggest that the four studied tyrosine residues are required for the interaction between XA21 and OsSERK2, and resistance to *Xoo*. Future studies will determine if XA21 loses its interaction with OsSERK2 *in planta* and identify if these tyrosine residues are phosphorylated during the XA21-mediated immune response.

Microhabitat Preferences of Native Perennial Grass Species

Troy E. Shea
Sponsor: Joseph M. DiTomaso, Ph.D.
Plant Sciences

Growth experiments of six perennial grass species were carried out in three different microhabitats to determine if current distributions of species was indicative of habitat preference or another factor. The site location is in Rescue, CA in the Sierra Nevada Foothills at an elevation of approximately 1500 ft. Habitat surveys were conducted for each species to determine where they currently exist. This survey was used to compare with the results of the growth experiment. Plugs were planted in mid-December from plants grown from seeds, and collected either on site or a nearby location, thus ensuring the local ecotype was present. Growth measurements included plant height, number of leaves, and number of tillers. The results of this experiment have implications for grassland restoration. If species show particular microhabitat preferences, restoration can be more effective by placing particular species in the most suitable microhabitats at a site, rather than planting or seeding a mix throughout the site. This approach not only would reduce costs but also increase success rates.

Assessing Knowledge and Public Perceptions of Foster Youth and the Foster Care System in California

Ashley P. Shepard
Sponsor: Jacob Hibel, Ph.D.
Sociology

California's welfare system is currently in the process of undergoing a period of comprehensive reform, which will impact over 50,000 youth in the foster care system. This reform will increase the already existing need for foster families. The goal of this research project is to collect and analyze data gathered from a survey we created that is intended to measure California adults' awareness of and orientations toward foster parenting, foster youth, and the foster care system. No survey exist today that directly address adults knowledge and perceptions of foster you and the foster care system. By collecting high-quality data from this unique survey, we hope to discover impactful information to disseminate amongst target populations that may have misconceptions about foster youth or the foster care system. To address these misconceptions we will create an outreach campaign. The survey will be key in the development of an awareness campaign geared towards the recruitment of foster families and addressing misconceptions that potential families may have.

An Investigation of the Functional Consequences of Centromere Protein C Evolutionary Variation

Hadley E. Sheppard
Sponsor: Luca Comai, Ph.D.
Plant Biology

Centromeres are loci where spindle microtubules attach to dividing chromosomes. This attachment is mediated by the kinetochore, a macromolecular protein complex that is critical for accurate segregation of chromosomes to daughter cells. The DNA sequence at centromeres is composed of tandemly repeated sequences. These repeats are by themselves incapable of specifying a functional centromere. Instead, the centromere-specific histone CENH3 is the key determinant of centromere identity, thereby suggesting that the centromere is epigenetically specified. The role of this histone variant within centromeric chromatin is conserved across all examined eukaryotes. The direct interaction partner of CENH3, CENP-C, is also a conserved centromere protein. Despite this apparent conservation of function, the protein sequences of both CENH3 and CENP-C are rapidly evolving, the cause and implication of which remain to be understood. Here, we ask whether CENP-C evolutionary variation has functional consequences by conducting a genetic complementation assay of a CENP-C null mutation in the model species, *A. thaliana*. We have cloned CENP-C from *Brassica rapa* and *Lepidium oleraceum* and generated *A. thaliana cenpc* complementation lines. We are currently assaying the effect of evolutionary divergence on the mitotic and meiotic functions of CENP-C.

Quantum Spin Liquid in the Kagome Lattice

Nicholas E. Sherman
Sponsor: Rajiv Singh, Ph.D.
Physics

Quantum phases of matter allow for exotic particles that cannot be observed anywhere else. One example is the hole, which plays a vital role in semiconductors, the essential ingredient in modern computers. Such exotic particles play important roles in novel material phases, such as topological quantum computers, and superconductors. These quantum phases of matter host the potential for exciting new discoveries, and one of great interest in recent years is the quantum spin liquid (QSL). The material Herbertsmithite (ZnCu3(OH)6Cl2), first synthesized in 2012, is believed to be a QSL due to the Copper ions' kagome lattice structure. If Herbertsmithite is shown to be a QSL, it would be the first real material to exhibit this phenomenon. Many experimental techniques have been performed on Herbertsmithite, such as nuclear magnetic resonance (NMR) and neutron scattering. However, it is still not known if the data gathered is intrinsic to the kagome lattice and not overwhelmed by the surrounding complex structure. We provide a controlled, computational study of the kagome lattice, and calculate the relevant dynamical quantities to compare with experimental data. Our research shows good qualitative agreement with NMR data, and we intend to have calculations to compare with neutron scattering soon.

A Statistical Analysis of National High School Circuit Debate Rounds

Ariel Shin
Sponsor: Norm Matloff, Ph.D.
Computer Science

There is a keen interest in the use of statistical methodology in sports. Such methods are valuable not only to sports sociologists but also those in sports themselves, as exemplified in the book and movie "Moneyball." These statistics categorize and quantify these activities, allowing us to compare players and even attempt to predict games. However, elimination tournaments present special statistical challenges. My research seeks to explore tournament data of the national high school debate circuit, in which there are 6 pre-elimination rounds and debaters with winning records advance to elimination rounds to determine a single winner. This atypical format requires the raw data to be processed into a more productive form. My objective is to analyze debate trends and eventually predict outcomes of debate rounds in the R programming environment. Moreover, these goals require exploring questions such as, do some schools win more than other schools, does gender affect the outcome of rounds, does geography play a role in wins/losses, and what constitutes an upset. The purpose of this project is to be used as a teaching tool and allow the debate community to understand the inequalities that exist in relation to gender, region, and school.

The Baby-Associated Built Environment (BABE) Microbiome Project

Melanie N. Shojinaga
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Before birth infants are nearly sterile but are immediately exposed to a wide array of environmental microbes upon birth. One microbial group common to the infant gastrointestinal tract, bifidobacteria, may assist in the development of the infant immune system. Bifidobacteria are less prevalent in infants in developed countries, possibly due to differences in transmission to infants. The Baby-Associated Built Environment (BABE) Microbiome Project investigates this possibility in three ways: analysis of the microbiota of man made environments that might mediate transmission of bifidobacteria, studies of the survival of a model bifidobacteria (Bifidobacterium longum subsp. infantis) outside the gastrointestinal tract, and surveys of the gut microbiota of infants with different levels of social exposure. Results indicate that bifidobacteria can be found in the built environment, where they may survive for up to two weeks. These results support the hypothesis that bifidobacteria are transmissible via the built environment, however, there is no clear answer yet as to what the predominant source of these extracorporeal bacteria is. Further study may yield greater insight into the impact of differing levels of exposure to environmental bifidobacteria on the infant gut microbiome.

State-Level Immigration Legislation

Katherine W. Shuai
Sponsor: Erin R. Hamilton, Ph.D.
Sociology

In the continued absence of federal comprehensive immigration reform, the U.S. has seen an unprecedented increase in state legislation shaping both the integration and the control of immigrant populations, with particular attention to the significant variation in policies addressing undocumented immigrants. Texas and Arizona are two states that exemplify the nation's main immigration policy trends—an increase in state-level legislation, and the adoption of either permissive or restrictive policies. While existing studies compare state variation on the basis of pro- or anti-immigrant intentions, they do not explicitly differentiate between legislation in policy areas of state jurisdiction (such as education, licensing, and state benefits) and legislation overlapping with the federal domain of immigration policy (such as law enforcement, citizenship, and human trafficking). Looking at Arizona and Texas, this research aims to better understand immigration policy and its variability by exploring treatment of undocumented immigrants as regulated in the past decade through the formation of state legislation vis-à-vis federal law. Analyzing state laws and corresponding justifications through frameworks distinguishing pro-immigrant from anti-immigrant stances, federal from state responsibility, and formal from normative deportability can contribute to understandings of contemporary policy trajectories and the changing contours of the immigrant debate.

The Rise and Fall of AB101: Ethnic Studies Courses in Northern California's Public High Schools

Valentin Sierra
Sponsor: Jessica Bissett Perea, Ph.D.
Native American Studies

On October 9th, 2015, California Governor Jerry Brown vetoed Assembly Bill 101, which proposed to formally introduce Ethic Studies classes to all public high schools in conjunction with state standards and college requirements. Originally aimed at addressing issues of equity for the state's increasing minority students population, AB101's failure to become state law channels the complicated, turbulent, and polarizing history of Ethnic Studies as an academic field and discipline in the United States more broadly and in California specifically. Formalized in the late 1960s under the Third World Liberation Front student protests at San Francisco State University, Ethnic Studies advocates sought to legitimize the often silenced or distorted narratives attributed to people of color from around the world. Despite the vetoing of AB101, many public school districts throughout California have begun their own initiatives to introduce Ethnic Studies into their K-12 curriculum. This paper chronicles and analyzes the Sacramento City Unified School District's introduction of Ethnic Studies classes, curricula, and requirements for all of its high school campuses and students.

Progressive Improvement of 3D Structure Resolution of HEV VLP Bound to Functionalized Gold-Nano Clusters (Au102-C_6MI)

Aria Sikaroudi
Sponsor: R. Holland Cheng, Ph.D.
Molecular & Cellular Biology

Virus-like particles (VLPs) have been used as biologically stable nanocarriers for targeted delivery of immunogens and/or small molecules for vaccines and therapeutics. The Hepatitis E Virus (HEV) capsid protein was genetically engineered to form a recombinant, self-assembling VLP with exposed surface cysteines for covalent conjugation. Water-soluble nano-gold clusters ($Au102(pMBA)_{44}$) containing a functional group, six carbon-maleimide linker (C6-MI), were covalently bound to the VLP cysteines. Resolving the structural features of HEV-VLPs upon Au102-C_6MI conjugation is a crucial step in understanding the architecture of this novel drug-delivery platform. It is also important for determination of structural differences in the HEV-VLP upon Au102-C6MI conjugation, in locating the stable position of Au102-C6MI on the VLP surface, and in determining whether gold nanoclusters can improve the resolution of 3D structures via cryo-Electron Microscopy and Single Particle Reconstruction (SPR) methods. A preliminary 3D structure of HEV-VLP conjugated with gold linker arms on the cysteines was generated. In order to improve the resolving power of structural features, the 3D structure was subjected to progressive resolution thresholding and refined through a systematic classification of highly representative imaged particles.

An Investigation of Attentional Biases Towards Emotional Male and Female Faces in Early Childhood

Riley Sims
Sponsor: Susan Rivera, Ph.D.
Psychology

MacLeod et al.'s (1989) dot probe task (DPT) is the cornerstone research methodology employed for measuring attentional bias towards emotional stimuli in adolescence and adulthood. In the current study we administered a modified eyetracking DPT to investigate, for the first time, young children's attention biases to emotional stimuli, and to specifically explore children's attentional bias towards the gender of the faces presented in the task. We administered our task to 122 children (53 girls), ranging from 9 to 49 months of age. We found that across age groups, participants performed differently towards emotional female and male faces ($F(1,118) = 37.85$, $p < .0001$). Participants were significantly biased towards emotional female faces, yet were significantly avoidant of emotional male faces. This suggests that young children may differentially attend to gender based upon differences in early experience. Further analysis showed that age was significantly negatively correlated with bias towards emotional female faces ($r(120) = -.18$, $p < .05$), but not with emotional male faces. Consequently, future research must examine the underlying mechanisms shaping young children's attentional biases towards emotional stimuli with age, while also investigating the underlying factors contributing to young children's differential processing of gendered stimuli using the DPT.

Gene Expression of PGLYRP-3 and IL-8 in Response to Pathogenic *Eschericia coli* and Commensal *Lactobacillus reuteri* and *Bifidobacterium*

Kartik Singhal
Sponsor: Elizabeth A. Maga, Ph.D.
Animal Science

There is a growing understanding of the importance of the microbiome in causing and preventing intestinal disorders. To investigate the dynamics of host and microbe interactions in the intestine, we compared gene expression of the innate recognition protein, Peptidoglycan Recognition Protein-3 (PGLYRP-3) and pro-inflammatory cytokine, Interleukin-8 (IL-8), in the presence of either pathogenic *Escherichia coli* or commensal *Lactobacillus reuteri* and *Bifidobacterium*. Mammals have four PGLYRP genes. PGLYRP-3 has the highest expression in the upper gastrointestinal (GI) tract. Though it's secreted by epithelial cells to kill bacteria by interacting with the peptidoglycan cell wall and initiating the bacterial suicidal mechanism; the mechanism by which it reduces inflammation is still unknown. PGLYRPs have been shown to lyse E.coli in this manner, thus we hypothesize that a rise in PGLYRP-3 expression should correlate with a reduction in IL-8 expression. E. coli is a gram negative bacteria, and so has less peptidoglycan than the gram positive *Lactobacillus reuteri* and *Bifidobacterium*. The excess peptidoglycan may be responsible for inducing PGLYRPs which in turn maintain low inflammation. Using pigs as a model for humans, a neonatal porcine intestinal cell line (IPECJ-J2) was incubated with different bacterial species and qRT-PCR was used to quantify gene expression.

Identification of PrtA's Role as an Antivirulence Factor of Pierce's Disease

Tajinderpal S. Sohal
Sponsor: Abhaya M. Dandekar, Ph.D.
Plant Sciences

Xylella fastidiosa (Xf) is a class of Gammaproteobacteria that colonizes the xylem tissue. *Xf* affects a number of crops, Almond Leaf Scorch in almond trees and Pierces Disease in grapes, and plays a significant economic role. LesA has been identified as a virulence factor which accelerated the symptoms of Pierces Disease whereas PrtA appears to be an antivirulence factor; however, PrtAs role is not certain. Initial symptoms of *Xf* infection can be seen on the leaves of the host plant. Edges of the leaf begin to dry out and appear normal towards the petiole. Over time, the entire leaf will dry out followed by the entire host plant. To study the roles or LesA and PrtA an order is then placed to the transformation facility for the transgenic plants. Once we receive the transformed plants, they are screened to confirm the gene is present. The protein is then extracted and a Webern blot is preformed to confirm presence of protein. Plants are then self-pollinated and seeds are germinated on selective media. Inoculation of these plants with *Xf* (2 months after potting) allows for phenotypic observations. These observations will help in determining PrtA's role as an antivirulence factor of Pierces Disease.

Retino-Retinal Projections in Development of Ferret

Ana Marija Sola
Sponsor: Hwai-Jong Cheng, M.D.,Ph.D.
Neurobiology, Physiology & Behavior

Past literature has shown that various animal species exhibit a divergence from the canonical pathway of visual sensory input in the form of retino-retinal projections. These retino-retinal projections extend between the two eyes, primarily during embryonic development, and may be implicated in the development of early retinal waves and inter-eye competition. Despite characterizations of these retino-retinal projections in various species, it is unknown whether these projections serve a specific function, such as those proposed earlier, or whether they are aberrant misguidances. In order to address these questions, characterization studies were conducted in the ferret, which is born with a relatively premature visual system, allowing for postnatal studies. Unilateral intraocular injections of fluorescent choleratoxin subunit B (CT-B 594) tracer resulted in anterograde labeling of axons and retrograde labeling of retino-retinal retinal ganglion cells (rrRGCs) in the eye contralateral of the injection site. Our preliminary results suggest that the cell bodies of the rrRGCs on the contralateral eye predominantly occupied the nasal side, and the labeled retino-retinal axons projected to the temporal side. These results will provide a ground work for our future studies of the functional role of retino-retinal projection.

Phytohormone Induction of Solanaceous Hosts in Response to '*Candidatus Liberibacter solanacearum*'

Pyae Sone
Sponsor: Clare Casteel, Ph.D.
Plant Pathology

'*Candidatus Liberibacter solanacearum*' (Lso) is a gram-negative, obligate bacterium transmitted by the potato psyllid, *Bactericera cockerelli*. Our long-term goal is to better understand the interaction of Lso with host plants to improve disease management. This research project focuses on determining host plant preferences of Lso, and the mechanisms mediating host preference. In preliminary experiments, Lso titer was the lowest in pepper compared to tomato, potato and carrot while psyllid survival was the highest in pepper compared to other plants. Also, Lso acquisition from pepper by psyllid was significantly lower than tomato. These data suggest pepper is an inferior host for Lso. We hypothesize that aspects of plant defense may be induced to a higher level in pepper compared to other host plants. To test this hypothesis, we will assay the induction of salicylic acid (SA) and jasmonic acid (JA) by liquid chromatography-mass spectrometry (LC-MS). SA and JA are phytohormones that regulate plant defenses. We will compare the differences in tomato and pepper phytohormone induction across three experimental groups; Lso-positive psyllid infestation, Lso-negative psyllid infestation and no Lso/no psyllid control. These results may reveal if differences in plant defense response may limit host specificity for Lso.

Cellular Response of Rabbit Corneal Stromal Fibroblasts to Heat Shock Protein 90 Inhibition on Different Substrate Stiffness

Yeonju Song
Sponsor: Sara M. Thomasy, D.V.M.,Ph.D.
Surgical & Radiological Sciences
School of Veterinary Medicine

During corneal wound-healing, changes in microenvironments affect biomechanical properties of corneal stroma. This involves transformation of resting keratocytes into activated fibroblasts which subsequently convert into myofibroblasts (KFM transformation). Heat shock protein 90 (Hsp90) stabilizes transforming growth factor β (TGFβ) activation, a cytokine critical in KFM transformation. We hypothesized that substrate stiffness regulates the response of rabbit corneal fibroblasts (RCFs) to Hsp90 inhibition in the presence or absence of TGFβ1 stimulus. To test our hypothesis, primary RCFs were cultured on petri dishes (TCP) and hydrogels with different stiffness (5KPa – normal homeostatic state and 25KPa – wounded state) in the presence or absence of 10ng/mL TGFβ1 and 500nM 17-demethoxygeldanamycin (17AAG; Hsp90 inhibitor) for 72 hours. Keratocyte or myofibroblast transformation was determined by qPCR, Western blotting, and immunocytochemistry. On TCP with TGFβ1 stimulation, transformation from fibroblast to myofibroblast was substantially greater, but 17AAG inhibited this response regardless of TGFβ1. The response of cells on 25KPa gels had a similar tendency as TCP groups; however, the expression levels were significantly attenuated. In contrast, on 5KPa gels, 17AAG triggered a myofibroblast phenotype. Data demonstrate that Hsp90 treatment, although beneficial at greater stiffness (mimicking wounded-state), may be detrimental on softer substrates (mimicking homeostasis).

The Effect of Language on Infants' Visual Investigation of Faces

Jessica Sorensen
Sponsor: Lisa M. Oakes, Ph.D.
Psychology

Processing information about faces and language develop together in infancy. For example, infants look differently at talking faces than at non-talking faces. The question is how language affects infants' face perception, and whether this effect differs for familiar versus unfamiliar languages. In an on-going study, we are presenting infants with a picture of a woman's face accompanied by an audio recording of a woman speaking English, accompanied by an audio recording of a woman speaking Mandarin, or in silence. Using eye-tracking equipment, we can measure precisely where infants look at the face in each condition. We anticipate that when hearing English (the familiar language), infants will look more at the woman's eyes, whereas when hearing Mandarin (the unfamiliar language) they will look more at the mouth. This pattern, which is predicted from other findings, may indicate that when infants hear English they no longer need to look at the mouth due to the development of other aspects of social communication, specifically eye gaze. On the other hand, when hearing Mandarin, infants' may need to focus on the mouth to process the new language input. This study will add to our understanding of how language influences infants' facial perception.

Shakespeare's Machiavellian Political Figures and Their Internal Conflicts in Reconciling Religious Affiliations With Political Motivations

Kaylin Squyres
Sponsor: Frances Dolan, Ph.D.
English

Although Machiavelli's influence on Shakespeare's writing has been hotly contested, each share a fascination with the questions: "what makes one fit to govern a state?" and "can one afford to have a sense of morality, or even theology, in a governance?" As a result, many of Shakespeare's political figures assume a Machiavellian model of rulership. Richard III, Hamlet, Claudius, Henry V, and Angelo all wrestle with the notions of being feared versus loved, the ascension to the throne through their own prowess, and the idea that the end justifies the means. Machiavelli describes the mechanisms for obtaining and maintaining power in a state, which strays from the previously instated divine right mode, in which the people believed that God anointed a king and granted him the power to govern the people. This shift from a theological to a more humanist mode of governance, however, often contributes to an internal struggle within Shakespeare's characters. Their morally inept politics seem to reconsider their supposed devotion to God. However, although these political figures appear to be internally conflicted due to their religion, their religious affiliations, like their political aspirations, are self-interested and not based on a dedication to God.

Survival of Probiotic *Lactobacillus plantarum* in a Mouse Model of Inflammatory Bowel Disease

Yanin T. Srisengfa
Sponsor: Maria Marco, Ph.D.
Food Science & Technology

Inflammatory bowel disease (IBD) affects approximately 1.6 million people in the United States. IBDs are characterized by chronic inflammation of the gastrointestinal tract. Studies on *Lactobacillus plantarum*, a bacterial species essential for the production of fermented foods, have shown that this organism can reduce inflammatory responses in the mammalian digestive tract. However, the specific cell products made by *L. plantarum* in the intestine that are responsible for these anti-inflammatory effects and *L. plantarum* survival in the inflamed gut are largely unknown. We employed a mouse model of IBD to investigate the importance of different *L. plantarum* strain WCFS1 genes to conferring survival in the digestive tract. Specifically, we investigated *L. plantarum* WCFS1 mutants deficient in genes for sucrose metabolism (*Scr*), nitrate respiration (*nar*), and plantaricin production (*Pln*). For a period of five consecutive days, we examined the levels of wild-type and mutant *L. plantarum* in fecal samples from healthy and colitis mice. We enumerated bacterial survival by plating and species-specific, quantitative PCR. Based on plating results, there is no significant difference between *L. plantarum* wild-type and mutant strains during inflammation; however, *L. plantarum Scr* mutant survived in higher numbers compared to wild type and other mutant strains from healthy mice.

Assessing Knowledge and Public Perceptions of Foster Youth and the Foster Care System in California

Shubhangi Srivastava
Sponsor: Jacob Hibel, Ph.D.
Sociology

The California child welfare system is currently in the process of undergoing a period of comprehensive reform which will ultimately phase out long-term group home placements for youth in foster care. These reforms are anticipated to increase the already growing need for foster families in California. The goal of this research project is to analyze data gathered from a survey intended to measure California adults' awareness of and orientations toward foster parenting, foster youth, and the foster care system. Information gathered from the survey will help to formulate conclusions regarding, for example, whether adults who perceive financial concerns as the biggest obstacle to fostering would be less likely to report an interest in fostering than adults who report other types of obstacles. The survey findings will be disseminated amongst key target populations that may have misconceptions about foster youth or the foster care system. In order to address these misconceptions, the survey findings and previous academic research will be utilized to develop an outreach campaign geared towards: reducing the stigma that currently surrounds foster youth and families, increasing awareness of the growing need of foster families in California, recruiting additional foster families, and addressing misconceptions that potential families may have.

Identifying Barriers to Diabetes Management and Areas of Knowledge Deficit About Type 2 Diabetes Among the Homeless Population

Jessica Steinert
Sponsor: Jaesu Han, M.D.
Psychiatry & Behavioral Sciences
School of Medicine

Diabetes mellitus has been a disease on the rise, currently affecting 29.1 million people in the United States, with another 8.1 million Americans who remain undiagnosed. Diabetes mellitus is a serious, usually lifelong disease that can result in serious health risks if it remains unchecked. The homeless community has been associated with higher percentages of diagnosed diabetics, as well as facing more barriers to managing their disease. Our goal is to gain a better understanding of the barriers the homeless community faces in managing diabetes and how this can affect their overall diabetic health. To research these barriers, we will be conducting a study of approximately 40 homeless individuals with Type 2 Diabetes who attend the Willow Clinic in Sacramento. The study will consist of a survey, which will test individuals on their general knowledge and understanding of diabetes, the resources they have to help manage their diabetes, and other barriers they might face on a daily basis. The goal of our study is to identify the most common areas of knowledge deficit about type 2 diabetes. Overall, we hope the study will us improve our resources and care to our patients.

Visas for the Undocumented Irish: *The Roots of the Diversity Immigrant Visa Program, 1987-1994*

Jasmine M. Stoltzfus
Sponsor: Lorena Oropeza, Ph.D.
History

Nearly 14.5 million people from around the world applied to the Diversity Immigrant Visa Program or "Green Card Lottery" in 2015 with hopes of "winning" one of just 50,000 permanent resident visas. Both the long odds and the global reach of this program, however, mark a significant departure from its original purpose in the 1980s—to legalize undocumented Irish individuals. This research focuses on how immigrants from Ireland successfully pushed for legislation that resulted in a series of precursor visa lottery programs that granted over 48,000 spots especially for them. While many historians have studied undocumented Latin American populations in the US, very little scholarly research has been devoted to the narratives of other, lesser-known undocumented communities. I use documents from NYU's Archives of Irish America along with national, international, and Irish-ethnic newspapers, such as The Irish Voice, *The Irish Times, The New York Times*, and *The Wall Street Journal* to recover the forgotten story of these programs. My research thus far suggests that the undocumented "New Irish" of the 1980s capitalized on their mother tongue, national origin, political connections, and ethnic identity to obtain this sequence of visa allocation programs that were specifically tailored to fit their unique needs.

HDL Lipidomic, Proteomic and Functional Changes in Response to Whole Egg Consumption in Overweight and Obese Women

Ellen M. Street
Sponsor: Francene Steinberg, Ph.D.
Nutrition

An increased prevalence of type 2 adult onset diabetes is associated with high incidence of cardiovascular disease. Preventative solutions may lie within your diet. The objective of this study is to analyze the "good cholesterol," or, high-density lipoprotein particle composition and function in individuals consuming eggs vs. yolk-free egg substitutes daily. The study will implement a randomized, repeated measure, cross-over, single-blinded intervention trial to characterize the effects of whole egg consumption compared to consumption of yolk-free egg substitutes on HDL composition and function in overweight and obese post-menopausal women. Blood samples will be collected before and after 4 weeks of dietary intervention. We hypothesize that whole eggs, not the egg substitute, will influence functional changes to the HDL, affecting cholesterol efflux and anti-oxidant capacity. Responders and non-responders will be identified using ApoA-1, a functional HDL protein, in plasma, indicating protective, functional HDL particles. The outcome of this study will provide information regarding human metabolic response to egg consumption in overweight and obese women at risk for developing CVD. Whole egg consumption is expected to alter HDL composition; improving its function. This will help provide whole-food dietary recommendations for targeted, at-risk populations and otherwise strengthen support for whole food preventative healthcare.

The Effects of Prenatal Stress on the Development of Anxiety and Depressive Behaviors in Prairie Voles (*Microtus ochrogaster*)

Kevin L. Su
Sponsor: Karen Bales, Ph.D.
Psychology

The prenatal period is a critical time in neurodevelopment, so exposures to stress can have long-term effects on the developing brain and subsequent behavior. Prenatal stress (PS) effects are particularly apparent when examining affective behaviors such as anxiety and depressive-like behaviors. Although previous studies have established such effects in rats, little research has examined PS in prairie voles, a unique research model because of their monogamous social bonding and bi-parental care. Additionally, PS may increase sensitivity to quality of parental care which may result in both negative and positive outcomes. This study seeks to determine whether PS alters offspring responsiveness to quality of parenting as indicated by anxiety and depressive behaviors. Seventy-eight voles were exposed to either prenatal stress or control conditions and cross-fostered to either high or low quality parents during the first few days of life. As adults, voles were subjected to an open field test and forced swim test to measure anxiety and depressive behaviors. We expect to find that PS prairie voles that receive high-quality parenting will display less anxiety and fewer depressive-like behaviors than PS pups that receive low-quality parenting. However, voles not exposed to PS to be less affected by quality of parental care.

Silencing the Ventral Hippocampus May Cause a Deficit in Contextual Fear Memory Recall

Sassan Suarez
Sponsor: Brian Wiltgen, Ph.D.
Psychology

Memory formation involves encoding and storing information for recall. Recent studies suggest that reactivation of hippocampal and cortical networks active during learning is needed for memory recall. Using optogenetics and contextual fear conditioning, our lab found that silencing CA1 neurons in the dorsal hippocampus (HPC), a region involved in learning and memory, caused a significant reduction in the amount of freezing behavior during re-exposure to the fear context. When activity was quantified in amygdala, a significant decrease in activity was observed in the central nucleus (CeA) but not in the basolateral nucleus (BLA). This difference in amygdala activity led us to examine effects of silencing the ventral HPC, which projects to BLA. We hypothesized that silencing cells in the ventral HPC would cause a decrease in freezing behavior, relative to controls. The light-activated proton pump archaerhodopsin (ArchT) was used to allow us to inactivate cells with laser light. Preliminary results show that during the first 20 minutes of re-exposure, controls averaged 27.79% freezing/minute while the ArchT mouse averaged 7.56% freezing/minute. This reduction in freezing behavior is consistent with my hypothesis that silencing the ventral HPC would cause decreased freezing behavior.

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Mengxue (Fiona) Sun
Sponsor: Nolan Zane, Ph.D.
Psychology

Psychotherapy was first introduced and primarily practiced in Western societies. Even today, Whites and those of higher socioeconomic status (SES) are more likely to utilize and remain in psychotherapy than ethnic minorities and those of lower SES backgrounds (DHHS, 1999). One reason behind this disparity might be the group differences in willingness to self-disclose because psychotherapy can be effective only if clients self-disclose about their problems to their therapists (Stricker & Fisher, 1990). The current study examines ethnic, gender, and SES differences in self-disclosure tendencies among a diverse sample of college students (N=366). Findings indicate that Whites self-disclose more than Asian Americans, females self-disclose more than males, and higher SES individuals self-disclose more than lower SES individuals. These results may provide some insight into why certain groups— specifically, Asian Americans, males, and those of lower SES backgrounds—underutilize psychotherapy and mental health services. In order to effectively use psychotherapy with diverse populations, modifications are necessary, depending on the clients' background. Therapists may need to develop strategies to enhance self-disclosure and ultimately increase therapy utilization in these groups.

Transforming la Comunidad: The Impact of Community-Based Participatory Research in Central California

Vanessa Talavera
Sponsor: Yvette G. Flores, Ph.D.
Chicana & Chicano Studies

The communities of Firebaugh and San Joaquin are located in Central California, and have experienced disparities in health, economics, and education. Through a Community-Based Participatory Research (CBPR) approach, Niños Sanos, Familia Sana (Healthy Children, Healthy Family), seeks to reduce childhood obesity and empower parents to be better advocates for their children's education. The aim of this study is to examine the CBPR in Golden Plains Unified School District (GPUSD), the comparison site for the Niños Sanos, Familia Sana study. The activities in GPUSD were developed through a CBPR approach to address disparities in the community identified by study participants. Educational workshops were developed to engage study participants from the comparison community. This type of engagement assures that the communities involved will be more than likely to be involved enough to make crucial changes. The use of CBPR proved to positively affect the community, which led some community members to develop additional projects. This study presents the methods used for the development of the workshops; workshop evaluations and community feedback. Findings from this study have implications for researchers who seek to work with underserved communities.

Synthesis and Evaluation of Thermodynamic Properties of Transition Metal Oxide Based Sodium Ion Cathode Materials ($NaMO_2$; M = Mn, Fe, Co and Ni)

Sindhoora Tallapragada
Sponsor: Alexandra Navrotsky, Ph.D.
Chemical Engineering & Materials Science

Lithium-ion batteries (LIBs) dominate the market. However, due to the growing scarcity of lithium and its increasing cost, researchers are seeking to instead use the cheaper and more abundant sodium. Sodium-ion batteries hold many advantages over LIBs, including increased safety in transportation, affordability and accessibility. If sodium is to replace lithium-ion cathode materials, the scientific community must know more about the thermodynamic properties of these materials. The energetics of sodium metal oxides, specifically, $NaNiO_2$, $NaCoO_2$, $NaMnO_2$, and $NaFeO_2$, are the subject of our research. These materials were synthesized using sol-gel method and the phase formation was confirmed using X-Ray Diffraction (XRD). Currently, composition determination of these materials using electron microprobe analysis is underway and soon after that we will perform high temperature drop solution calorimetry experiments to determine the enthalpy of formation of all the samples. We will interpret the stability trend using several factors including Na-M bond length and electronegativity of the transition metals.

Finding Early Markers for Autism: Comparison of Global Methylation Assays for High Throughput Studies

Mitchell Tam
Sponsor: Janine LaSalle, Ph.D.
Medical Microbiology & Immunology
School of Medicine

Autism Spectrum Disorders (ASD) cause significant behavioral challenges and impairment in social communication. The most important factor in the treatment of ASD is early detection. The MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) study is a prospective study following mothers and their children diagnosed with ASD with the goal of finding early markers for ASD. As a part of the MARBLES study, epigenetic effects of folate intake by pregnant mothers is being examined through the analysis of global methylation. The focus of this project is on identifying an optimal primer set that amplifies repetitive elements to use in conjunction with pyrosequencing technology. Pyrosequencing LINE-1 and ALU repetitive elements can assess methylation at multiple locations across the genome estimating global methylation. Although whole genome bisulfite sequencing is widely accepted as the standard method, pyrosequencing is a less costly and more time efficient technique suited for the use in large epidemiology studies such as MARBLES. By comparing the pyrosequencing results to whole genome bisulfite sequencing results, the primer set yielding the least variable and most accurate measure of global methylation can be selected for further use in the study.

The Transmission of Bifidobacteria via the Built Environment: Infants and Mothers as Sources

Jothika T. Tamizharasu
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Bifidobacteria inhabit the infant gastrointestinal tract and have been linked to increased resistance to pathogens. It is unknown how infants acquire bifidobacteria, though it has been hypothesized that this bacteria is passed from mother to child or between infants, possibly via the surrounding human-built environment. This study investigates potential built environment-mediated transmission of bifidobacteria to infants. To determine if bifidobacteria were present in locations frequented by infants and mothers, swab samples were collected from surfaces with which they come into contact, including surfaces in lactation rooms (where only mothers are present), baby-changing tables (with which both mothers and babies interact), and daycare centers (where children mutually interact). Dual swabs were collected at each sampling location: one for plating onto selective media and the other for DNA sequencing analysis of the microbiota. Isolates were obtained from the plates and identified using Matrix-assisted Laser Desorption Ionization (MALDI) Biotyper and bifidobacteria-specific Terminal Restriction Fragment Length Polymorphism (Bif-TRFLP). Preliminary results confirm that bifidobacteria are found in areas frequented by breast-feeding mothers, suggesting that mothers are potential bifidobacterial vectors. Future experiments will investigate whether bifidobacteria may be transmitted between infants and how the microbiota of these surfaces differs between sites, environmental conditions, and over time.

Popular Homemade Brazilian Mosquito Repellent Recipe May Be Misleading

Kaiming Tan
Sponsor: Walter S. Leal, Ph.D.
Molecular & Cellular Biology

The global population is becoming more conscientious about using mosquito repellents to reduce mosquito bites and avoid disease transmissions because of the explosive pandemic of Zika virus in Brazil. Authorities have recommended the use of insect repellents, particularly DEET (the gold standard of insect repellents), picaridin, and IR3535. However, there is an aversion to synthetic compounds and an interest in natural recipes, including one based on "Cravo da India" (=*Syzygium aromaticum*). Here, we report on repellency of this recipe and its main constituent in comparison to DEET. We replicated the Cravo da India repellent recipe and performed surface landing and feeding behavior assay using four-day-old and non-blood-fed female *Culex quinquefasciatus*, the Southern house mosquitoes. After analyzing the natural repellent by gas chromatography-mass spectrometry (GC-MS), we tested the major constituent of this popular formulation. In our behavioral assays, the popular Cravo da India recipe showed lower repellent activity than DEET. Likewise, eugenol, the main constituent of the natural repellent, elicited lower spatial repellency than DEET. Therefore, we concluded that due to the low complete protection time of the natural repellent because of rapid evaporation, the advertisement for this homemade repellent to protect against the vector of Zika virus is misleading.

The Effects of Oxytocin on Stress Regulation

Phillip Tan
Sponsor: Brian C. Trainor, Ph.D.
Psychology

Oxytocin (OT) has emerged as a potential new treatment for stress induced psychiatric disorders like anxiety and depression, but the specific involvement of OT circuitry remains to be studied. Although anxiety and depression are twice as common in women than men, most preclinical studies only use males. By using the California mouse (*Peromyscus californicus*), our lab has found that only females display long term social withdrawal after being exposed to stress, and that this is associated with sex-specific changes in OT signaling. For example, females show increased OT activity in a brain region associated with anxiety. We also found that intranasal OT results in social withdrawal in females but not males who were naïve to stress. These findings led to the hypothesis that the activation of OT receptors (OTR) may contribute to stress-induced social withdrawal. We conducted a study in which stressed and naïve females received OTR antagonist before behavioral testing. Stress significantly reduced social behavior in females, and in support of our hypothesis, the administration of OTR antagonist *reversed* this effect of stress. By using molecular techniques, we are currently assessing which specific brain areas change in its activity with response to social stress and OTR antagonist.

Prenatal Stress in Prairie Voles Alters Brain Plasticity and Socio-Emotional Receptors

You You Tan
Sponsor: Karen Bales, Ph.D.
Psychology

Adversity during early developmental stages has often been viewed as having negative effects on an individual's lifespan. Exposure of an expectant mother to distress is one of the factors, which is known as prenatal stress (PS). Although PS has mostly been associated with negative effects on the offspring, our goal is to investigate any possible influence on brain plasticity from PS through autoradiography and brain region tracing. An increase in brain plasticity could be potentially beneficial because it could increase the susceptibility to the rearing environment. Our study was done in prairie voles due to their key characteristics of social monogamy and selective social behaviors, which is similar to humans and other mammalian species. We will be looking at the effect of PS and rearing environment on the densities of six receptors: oxytocin, vasopressin, reelin, CRH1, CRH1, and estrogen, which are all associated with socio-affective functioning. Our samples are the brains from 78 adult voles who were assigned to either a high or low quality rearing condition and a prenatal stress or control condition. All brains will be sliced by cryostat and will undergo autoradiography and tracing to locate and quantify the brain receptors.

Japanese Plant Imagery in the West, Late 19th to Early 20th Century

Naoto Tanaka
Sponsor: Katharine Burnett, Ph.D.
Art & Art History

After Japan ended its isolationist policies and opened up ports for international trade in the 1850s, the collection of Japanese objects became a trend in the West, especially with artists. This led to a major movement in Western art of incorporating visual influences from Japanese goods, which was termed "Japonisme" by French art critic Philippe Burty in 1872. Though "Japonisme" is often attributed to artists "discovering" objects and visual culture from Japan, there were also conscious efforts by the Japanese that responded to the popularity of certain objects and imagery in the West. This was especially true for plant images, which connected with the movement by the Japanese government, industry, and individuals to make Japanese plants a major export item. Plants that the Japanese promoted through trade and World Fairs are found in many Western artworks, showing how the dynamics of the Japonisme movement had to do not only with art and artists in the Western world but also industries and policies of Meiji-era Japan, and trade between the two regions.

Factors Influencing the Survival of *Bifidobacterium longum* subsp. *infantis* in the Built Environment

Claudia Tang
Sponsor: David A. Mills, Ph.D.
Food Science & Technology

Bifidobacteria are a group of anaerobic microbes found in the infant gastrointestinal tract that aid in the development of immune response and increase resistance to some gastrointestinal infections. However, the mechanism by which infants acquire this anaerobic bacteria is poorly understood. Hypotheses on the route of transmission include transferal from the mother or from other infants, possibly via human-built environmental features. The length of time that bifidobacteria can persist outside the gastrointestinal tract and what conditions favor its transfer are important factors to consider when evaluating these hypotheses. In this study, cultures of a model species of bifidobacteria (*Bifidobacterium longum* subsp. *infantis*) were exposed to an array of environmental conditions and assayed for viability at regular time intervals to define which parameters hinder, or aid, its survival. Preliminary results showed that bifidobacteria survived longer at colder temperatures and can survive extracorporeally for up to two weeks. Continued research will provide further insight into which factors aid the survival and transmission of bifidobacteria.

Preparation for Mammalian Hibernation Is Insufficient to Induce the Increased Tolerance to OGD Seen During Deep Hibernation

Ekaterina A. Tangog
Sponsor: Barbara A. Horwitz, Ph.D.
Neurobiology, Physiology & Behavior

Neurons in mammalian hibernators are more tolerant to oxygen glucose deprivation (OGD), a model simulating stroke, than those not capable of hibernation. We previously demonstrated that OGD in hippocampal slices from hibernating Syrian hamsters (HH; core temperature <10°C) exhibited enhanced neuroprotection from OGD in comparison to hamsters exposed to summer-like conditions (SH; 14:10 h light: dark, 22+2°C). To examine the role that preparation for hibernation might play in OGD tolerance, we compared HH and SH hamsters to hamsters acclimated to winter-like conditions (i.e., at least three weeks in 8:16 h light:dark, 6+2°C), but had not yet hibernated (WH). We tested the hypothesis that neuroprotection from OGD would be greater in WH than in SH. Hippocampal slices were placed into a recording chamber perfused with artificial cerebrospinal fluid, and stimulating electrodes were positioned onto the nerves innervating CA1 pyramidal neurons. Population spike amplitudes (PSAs) were recorded from the CA1 cell layer. The PSA response to OGD did not differ between WH and SH groups. In contrast, the HH group did exhibit enhanced tolerance to OGD. These results negate our hypothesis and suggest that entry into hibernation is required for the increased OGD tolerance of the hibernating hamsters.

High-Throughput Analysis of Foodborne Bacterial Genomic DNA Using Agilent 2200 TapeStation and Genomic DNA ScreenTape System

Lyvin Tat
Sponsor: Bart C. Weimer, Ph.D.
Population Health & Reproduction
School of Veterinary Medicine

The initial step in Next Generation Sequencing is to construct a library from genomic DNA. To gain the optimum result, extracted DNA must be of high molecular weight with limited degradation. High-throughput sequencing projects, such as the 100K Pathogen Genome Project, require methods to rapidly assess the quantity and quality of genomic DNA extracts. In this study, assessment of the applicability of the Agilent 2200 TapeStation was done using genomic DNA from nine foodborne pathogens using several accepted high-throughput methods. The Agilent 2200 TapeStation System with Genomic DNA ScreenTape and Genomic DNA Reagents was easy to use with minimal manual intervention. An important advantage of the 2200 TapeStation over other high-throughput methods was that high molecular weight genomic DNA quality and quantity can be quantified apart from lower molecular weight size ranges, providing a distinct advantage in the library construction pipeline and over other methods available for this important step in the Next Generation Sequencing process.

Democracy and Intervention: An Analysis of Collective Military Intervention Under the European Union's Common Security and Defense Policy

Mikaela N. Tenner
Sponsor: Heather McKibben, Ph.D.
Political Science

Since 2003, the European Union (EU) has had the ability to initiate collective military intervention through the Common Security and Defense Policy (CSDP). This study analyzes the driving forces behind the EU's likeliness to initiate such an intervention. Specifically, I examine the impact that the level of democracy in a country has on the EU's likeliness to intervene when a military conflict arises in that country. For the purposes of my study, Polity IV variables are used to measure a country's level of democracy. I analyze this variable against intervention, which I consider as cases in which the EU initiates a military or civilian mission in which they commit at least 30 personnel on the ground of the conflict. My statistical analysis reveals that there is a significant negative correlation between the two variables. Therefore, it should follow that there is a statistically significant negative relationship between a country's level of democracy and the EU's likeliness to intervene when conflict arises in that country.

Role of RNF212 as a Checkpoint Protein in Irradiation-Induced DNA Damage Response

Addy Tham
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

RNF212 catalyzes conjugation of the Small-Ubiquitin-like Modifier, SUMO, and is known for its role in homologous recombination. Our lab recently showed that RNF212 is an integral component of the checkpoint pathway that signals oocyte apoptosis. In females, the number of oocytes (eggs) is fixed at birth and diminishes with age, determining the reproductive lifespan. Oocytes that experience defects in meiosis are hypothesized to be lost through a quality-control process. Previously, we have shown that RNF212 is necessary for oocyte apoptosis in mutant mice that experience endogenous meiotic defects. However, the role of RNF212 in the response to exogenous DNA-damage, such as chemotherapy, remains unknown. To address this question, we administered varying doses of irradiation to mice at different ages. Immunohistochemistry staining methods were used to quantify oocyte loss following irradiation. Preliminary findings show that irradiated *Rnf212* mutant mice have more oocytes compared to irradiated wild-type controls, indicating that RNF212 has a role in the DNA-damage response of resting oocytes. These insights improve our understanding of factors that regulate female fertility and in the longer term may enable therapies to extend reproductive lifespan and maintain oocyte pools in chemotherapy patients.

Simulating How Polyploid Sturgeon Respond to Genetic Bottlenecks

Matthew Thorstensen
Sponsor: Andrea Schreier, Ph.D.
Animal Science

Population bottlenecks and subsequent genetic diversity loss can increase a population's vulnerability to extinction. Polyploid organisms, including the white sturgeon (*Acipenser transmontanus*), may be buffered from the effects of genetic drift and inbreeding after a bottleneck because they possess multiple gene copies. I am developing a simulation in the Python programming language to examine how bottlenecks of varying magnitudes affect genetic diversity loss in populations with different ploidies (2n, 4n, 8n). I predict that having more gene copies will allow a population to maintain more genetic variability following a bottleneck than diploid organisms of the same population size, faced with a bottleneck of identical severity. The software program will allow users to simulate the effects of bottlenecks of varying magnitude on populations with different ploidy levels (2n, 4n, and 8n) by allowing users to modify parameters such as population size, bottleneck severity, population growth rate following a bottleneck, frequency of individual alleles, and number of loci to be studied. The presentation will describe program features, provide simulation results, and discuss the program's potential applications for sturgeon management.

Analysis of Carbohydrates in Soil Under Different Maize Genotypes

Emily J. Tibbett
Sponsor: Richard Jeannotte, Ph.D.
Plant Sciences

Carbohydrates play important functions in soil aggregation and microbial nutrition. The knowledge on carbohydrate diversity within soil is scarce due to their chemical complexity, their presence in other biomolecules and limited evidence regarding the extent of their preservation in soil. Even if studying them in soils represent an important analytical challenge, we need to develop a pipeline for extracting and analyzing carbohydrates in order to understand the biological effects of the carbohydrates in root exudates. We hypothesize that the composition of the root exudates in carbohydrates released and present in soils is different among genotypes of the same plant. To verify this hypothesis, we collected soil samples from fields in which five maize genotypes were grown to compare the carbohydrates preserved in the soil. We developed a sequential method to extract carbohydrates from soils using LC/MS-grade water, 0.5mol/L sodium chloride, and 0.5mol/L sodium carbonate solution. The extracted carbohydrates were separated in monosaccharide and polysaccharide fractions using ethanol precipitation and porous graphitized carbon chromatography. The monosaccharide fractions were analyzed using GC/MS and the oligosaccharide fractions using MALDI/TOFMS. Looking at plant carbohydrates released into the soil provides insight into their preservation and their impact on the rhizosphere.

Development of a Simplified Tar Analysis Method for Biomass Gasification

Karl R. Tolentino
Sponsor: Bryan Jenkins, Ph.D.
Biological & Agricultural Engineering

Gaseous fuels and synthesis gases can be produced from biomass through thermochemical processing. In order for these thermally generated gaseous fuels to become a more promising energy source, the process should reduce the amount of by-product tar generated; good techniques need to be developed to reduce concentrations in the product gas. Quantifying tar levels then becomes an important task. The current standard for the measurement of tar in biomass gasification is complex and time consuming, including a series of steps intended to remove water and other non-tar components from the condensed sample fraction collected from the gas stream. Another way of drying is passing inert gas through the medium. Introducing this dry flow has been shown to remove moisture in systems such as pipelines and storage units. An investigation purging the condensed sample with N2 was conducted to determine the effectiveness of water removal and the extent which other volatile compounds are removed. Preliminary trials revealed significant variability, potentially linked to the duration of the purge. Work is continuing to determine necessary conditions for more consistent results. This presentation will include the results of these experiments and the potential for developing a less complex and more cost-effective tar analysis method.

An Intestinal Epithelial Cell PPARγ Knockout Mouse Model to Determine the Mechanism of Enterobacteriaceae Bloom in the Gut During Dysbiosis

Teresa P. Torres
Sponsor: Andreas Baumler, Ph.D.
Medical Microbiology & Immunology
School of Medicine

The gastrointestinal tract is host to a dense microbial community, known as the gut microbiota, which is dominated by bacteria belonging to the phyla Bacteroidetes (class *Bacteroidia*) and Firmicutes (class *Clostridia*). During antibiotic therapy, disruption of the gut microbiota leads to a decrease in the presence of *Clostridia* and a bloom of *Enterobacteriaceae* (e.g. *Escherichia coli*). We believe that *Clostridia* mediates protection against *Enterobacteriaceae* through microbe-host interactions that help modulate production of inducible nitric oxide (iNOS) by colonic epithelial cells (colonocytes), through butyrate production. Moreover, Peroxisome Proliferator Receptor Gamma (PPARγ) is one of the butyrate sensors in colonocytes and should be the key regulator of iNOS production in the gut. The Cre-lox mechanism was used to generate an intestinal epithelial cell specific PPARγ knockout mouse in order to study the role of PPARγ-induced iNOS in *Enterobactericaea* bloom happening during dysbiosis. Interestingly, PPARγ knockout mice were more susceptible to *Escherichia coli* colonization in an iNOS-dependent manner when compared to the littermates controls. Our results suggest that PPARγ plays a fundamental role in regulating iNOS production in colonocytes, which leads to important changes in the gut microbiota. Consequently, PPARγ may be used as a potential target to control antibiotic-induced dysbiosis.

Biomarkers of Mitochondrial Dysfunction in Huntington's Disease Fibroblasts

Audrey Torrest
Sponsor: Jan Nolta, Ph.D.
Cell Biology & Human Anatomy

Huntington's disease (HD) is a fatal autosomal dominant neurodegenerative disorder caused by an abnormal expansion of CAG repeats in the huntingtin gene. When this region contains more than 38 repeats, translation of the gene results in the formation of a protein known as mutant huntingtin, which is responsible for the disease. However, the exact function of the normal and mutant forms of the protein have not yet been fully elucidated. Nonetheless, it has become increasingly clear that altered mitochondrial function plays a key role in HD pathogenesis. This study examined mitochondrial dysfunction in human HD fibroblast cell lines through quantification of reactive oxygen species (ROS) by flow cytometry, ROS-induced DNA damage in the mitochondrial genome by qPCR, and gene expression implicated in energy metabolism and mitochondrial functioning by RT-PCR. These biomarkers were used to establish baseline differences in mitochondrial function of HD gene carrier and non-gene carrier cell lines to determine whether these biomarkers could be used for the evaluation of gene modification strategies that silence the mutant huntingtin allele.

The Role of Abortion in Turkish vs. United States Society

Atrin Toussi
Sponsor: Mairaj Syed, Ph.D.
Religious Studies

In 1983, Turkey legalized abortions within the first ten weeks of pregnancy. But in 2012, then-Prime Minister and now-President, Recep Tayyip Erdogan, abruptly announced that, contrary to Turkish law, he considered abortions to be the equivalent of murder. As a country with Islamic roots, the head of the Presidency of Religious Affairs (the Diyanet) quickly endorsed these statements. I attempt to analyze the significance of these changes. I will do so with respect to the abortion debate's role in Turkish society and policy at large and in contrast to its role in United States society and policy. To do so, I first develop a schematic of the logic of law making in Hanafi jurisprudence – the primary school of Islamic thought in Turkey. I then track the way abortion laws were created and enforced by Hanafi jurisprudence during the Ottoman Empire and subsequently, during modern-day Turkey. I next contrast 1983 – 2012 Turkey to the United States in the 1970s, where Evangelical Protestants shifted from a pro-choice platform to a very Catholic, pro-life one. Comparing the trajectories of these two countries' stances on abortion will ultimately reveal the abortion debate's function in maintaining these nations' differing self-narratives.

Minimal Capsule Protects *Cryptococcus neoformans* From Recognition by Human Neutrophils and Monocytes

Kevin Tran
Sponsor: Volkmar Heinrich, Ph.D.
Biomedical Engineering

Healthy humans rarely develop complications from exposure to the pathogenic fungus *Cryptococcus neoformans*. However, human neutrophils, the most common type of white blood cell and vital defenders against infection, do not recognize this fungus in single-live-cell experiments. Therefore, we hypothesized that immune cells of other types might be better equipped to recognize and neutralize *C. neoformans*. Control experiments showed that human monocytes, in contrast to neutrophils, were able to recognize fungal models like zymosan and β-glucan particles in the absence of autologous serum. Motivated by this observation, we examined the interaction between monocytes and *C. neoformans* during well-controlled one-on-one encounters. Using dual-micropipette manipulation to bring individual cells into contact with fungal particles, we studied the monocyte response to wildtype *C. neoformans* and to the mutant cap59Δ. The mutant has a defective capsule and was indeed readily recognized and phagocytosed by monocytes. However, like neutrophils, monocytes were unable to recognize the wildtype of *C. neoformans* even when the fungus had been grown in media that did not induce the formation of a thick, protective capsule. Our results show that the presence of a minimal fungal capsule enables *C. neoformans* to evade detection from both cell types.

Math-STEM-Students' Achievement

Khanh K. Tran
Sponsor: Debbie Niemeier, Ph.D.
Civil & Environmental Engineering

Despite strong demand in Science, Technology, Engineer, and Mathematics (STEM) fields, there always seems to be a shortage in the STEM workforce. The majority of students planning to pursue STEM majors either dropped out of college or switched to non-STEM fields of study. According to the Astin and Astin (1993) Higher Education Research Institute (HERI) studies, it was found that the number of students majoring in STEM majors declined from the freshman year to the senior year was from 28.7% to 17.4%, a 40% relative decline. This research examines whether math at the University of California, Davis is a barrier that keeps students from pursuing STEM degrees. We look at the rate of secondary and postsecondary students' intent to major in STEM, the rate of student dropout of STEM fields, and the reasons for these outcomes. If math is one of the reasons, we will determine the level of math that has the highest dropout or the lowest rate of passing and whether math is a barrier for students.

Development of a Standard Curve to Quantify Alpha-defensins and *Autoimmune Regulator (AIRE)* in the Thymus

Michelle T. Tran
Sponsor: Charles L. Bevins, M.D.,Ph.D.
Medical Microbiology & Immunology
School of Medicine

Alpha-defensins, a major class of antibiotic peptides in mammals, serve to protect from a broad spectrum of microorganisms. Paneth cells (PCs) are specialized epithelial cells found in the crypt of the small intestine; they secrete several antimicrobial peptides including alpha-defensins. C57BL/6 mice express eight alpha-defensins that have differential expression along the intestine. Recent studies have shown that alpha-defensins are expressed in the thymus, which is the site of T cell maturation. The *autoimmune regulator (Aire)* gene plays a role in the negative selection of autoreactive T cells. Others have shown that *Aire* regulates the expression of PC alpha-defensins in the thymus, and that mutations in *Aire* result in the destruction of PCs due to autoreactive alpha-defensin specific T cells. Our laboratory developed highly specific quantitative real-time PCR assays to quantify the absolute expression levels of Aire and each alpha-defensin mRNA in the thymus of C57BL/6 mice, and in this study we used these assays to quantify specific expression of alpha-defensin, Aire, and control genes in the thymus. Our data show that seven of the eight alpha-defensins are expressed with levels substantially lower than those in the small intestine.

Prenatal Stress in Prairie Voles Alters Brain Plasticity and Socio-Emotional Receptors

Laura V. Tran
Sponsor: Karen Bales, Ph.D.
Psychology

Prenatal stress (PS) has been shown to have immense effects on offspring development, subsequent behavior, and can potentially increase offspring sensitivity to the environment. Although PS has been investigated in regard to negative traits, increased sensitivity may be a benefit under positive environments. Thus, we will examine effects of both PS and the quality of the early environment on brain receptor densities in the prairie vole, a socially monogamous species. Voles will be assigned to be either prenatally stressed or not and cross-fostered to either high or low quality early environments. After euthanasia in adulthood, we will look at differences in the densities of six receptors: oxytocin, vasopressin, reelin, CRH1/2, and estrogen which all play a role in affiliative behaviors. 78 brain were collected and sliced with a cryostat. These brains will then undergo autoradiography and tracing to look at specific locations of the brain that have been correlated with affiliative behaviors. Our methods may demonstrate that PS and the early environment have an effect on the distribution and densities of these receptors. These results may broaden our understanding of the effects of PS and can link PS to not just negative outcomes but positive ones as well.

Glyconote: A Program for the Semi-Automated Characterization and Graphical Annotation of *De Novo* Glycans Analyzed With Tandem Mass Spectrometry

Guy Treves
Sponsor: Carlito B. Lebrilla, Ph.D.
Chemistry

The understanding of glycan polymers serves as the basis of many fields of science as these molecules undertake essential roles in the proper functioning of all branches of life. While methodologies to isolate and purify oligosaccharides exist, determining their structure, necessary to understanding function, is difficult. There are many naturally occuring monosaccharides, many have the same mass, and can link in many ways. Determining glycan composition and connectivity is thus analytically challenging. Glyconote is a powerful tool that analyzes the parent mass spectrum and its fragment ions and determines whether or not a peak in the mass spectrum originated from a sugar, and if it did, provide its composition in a graphical manner that allows an analyst to immediately determine the connectivity of that oligosaccharide. Glyconote analyzes thousands of mass spectrums per minute, accelerating the rate of mass spectrometry analysis and annotation from a few per month to many per day. Glyconote has been successfully applied to many different types of glycans, and, with the help of external tools, determined the connectivities of over 60 o-linked and 80 n-linked glycans in human serum, 50 human milk oligosaccharides, and 40 plant cell wall oligosaccharides.

Properties of the Interaction Between Major Histocompatibility Complex I and a Novel Synaptic Binding Partner

Vivian Trinh
Sponsor: A. Kimberley McAllister, Ph.D.
Neurobiology, Physiology & Behavior

Major histocompatibility complex I (MHCI) molecules are critical players in mediating the immune response and have recently been implicated in regulating neural development. Although previous studies show that MHCI decreases synapse density, the mechanism underlying this effect remains unknown. We recently discovered a novel interaction between MHCI and a family of synaptic adhesion molecules called neuropilins (NPN) and their binding partners, the plexins (PLXN). It is possible that MHCI could up-regulate surface expression or enhance the function of neuropilin, in order to reduce synaptogenesis. To test if MHCI levels regulate surface expression of NPN/PLXN, HEK-293T cells are transfected with NPN/PLXN either alone or with H2-Kb-YFP, and changes in their surface levels are imaged using confocal microscopy. To test which domains of these proteins are essential for affecting surface levels, mutant constructs for NPN and H2-Kb-YFP will be used in the HEK cell assay. Results from this study will provide details as to where and how MHCI and NPN/PLXN interact to aid in synapse formation and elimination. Additionally, these experiments will provide a better understanding of autism spectrum disorder and schizophrenia due to the strong genetic associations of both neuropilins and MHCI with both disorders.

The Characterization of Placenta-Derived Mesenchymal Stem Cells (PMSCs) for Use in Prenatal Treatment of Hemophilia A

Josephine Tsang
Sponsor: Aijun Wang, Ph.D.
Surgery
School of Medicine

Hemophilia A is a sex linked hereditary disease caused by a deficiency in clotting factor VIII. The disease affects 1 in 5,000 males, causing frequent bleeding. In those who are severely affected, soft tissue, joint, and muscle damage can occur from unresolved hemorrhage. Current methods of treatment include regular transfusions of factor VIII derived from human blood serum or recombinant sources. Stem cell therapy has been looked to as a potential novel treatment for Hemophilia A. Placenta derived mesenchymal stem cells (PMSCs) transduced with the Factor VIII gene may be introduced in utero to restore factor VIII production. Currently, PMSC's are being characterized for multi- potency in order to ascertain their potential for successful engraftment. Successful cell lines may, under adequate growth conditions, differentiate into chondrocytes, osteocytes, and adipocytes. Differentiation is characterized by production of oil droplets in adipocytes, calcium deposits in osteocytes, and the production of proteoglycan in pellet culture in chondrocytes. PMSCs will be further characterized by classification of differentiation (CD) markers, verified by flow cytometry.

Characterization of Plant Root Responses to Neighboring Plants

Carly L. Tyer
Sponsor: John I. Yoder, Ph.D.
Plant Sciences

Roots of different plants come in close contact in natural conditions. We are interested in understanding the chemical signals exchanged between roots of different plants. Inter-root communication is formed through the release of allelopathic chemicals that effect the growth of surrounding plants. Roots of parasitic plants have robust, easily assayed phenotypes in response to contact with other roots to provide a model for plant-plant interactions. The parasitic plant *QR1* gene is transcriptionally activated upon contact with roots of another plant. The promoter of *QR1* was linked to a *GUS* reporter gene and transformed into *Arabidopsis* plants as a means to visually monitor its expression in *Arabidopsis* roots. Assaying the blue stain due to *GUS* gene expression will identify spatial and temporal expression pattern of this plant promoter in response to other plants. This study is aiming to understand how parasitic plant roots respond to neighboring plants through the activation of special promoters.

Characterizing the Role of Mitofusin GTPases in Mitochondrial DNA Maintenance

Lauren F. Uchiyama
Sponsor: Jodi Nunnari, Ph.D.
Molecular & Cellular Biology

Mitochondria maintain a balance of fusion and division to preserve morphology and distribution, which are essential to their function, to ensure proper mitochondrial DNA (mtDNA) maintenance. In mammalian cells, mtDNA replication is spatially linked to sites of mitochondrial division, tying mitochondrial genome segregation to organelle dynamics. Countering division, mitochondrial fusion is facilitated by proteins Mitofusin 1 and 2 (MFN1/2). Previous work has shown that loss of MFN1/2 function results in mtDNA depletion in mouse embryonic fibroblasts (MEF), suggesting that MFN1/2 are required for mtDNA maintenance. However, it's unclear whether mtDNA loss is caused secondarily by the physical fragmentation of mitochondria, or more directly from the loss of MFN1/2-dependent signaling cascades. To test whether mitochondrial morphology sufficiently maintains mtDNA, we will restore mitochondria morphology by suppressing mitochondrial division in MFN deficient cells. Mitochondrial DNA copy number will be quantified under these conditions in wildtype, MFN1-knockout and MFN2-knockout MEFs. These data will provide a better understanding of the roles of Mitofusin proteins, and clarify the links between mitochondrial DNA and organelle dynamics

Sex Differences in the Prehospital Management of Out-of-Hospital Cardiac Arrest

Temur Umarov
Sponsor: Bryn Mumma, M.D.
Emergency Medicine
School of Medicine

Background: Out-of-hospital cardiac arrest (OHCA) is the most common cause of death from cardiac disease in the United States. There are very few studies comparing sex differences in pre-hospital treatments and outcomes. Methods: We studied adult patients in the ROC-PRIMED cardiac arrest database with a "presumed cardiac" etiology of OHCA and complete sex data, who received pre-hospital resuscitative efforts. Univariable analyses were used to compare sex differences in treatments and outcomes in pre-hospital medication administration (epinephrine, lidocaine, and amiodarone), time to defibrillation, pre-hospital termination of resuscitation, and pre-hospital disposition. Multivariable analyses were performed on these same outcome variables, to analyze if the following variables will predict the outcome: sex, age, public location of arrest, witnessed arrest, bystander CPR, and shockable rhythm. Results: Women were less likely to receive pre-hospital epinephrine, lidocaine, and amiodarone. Time to defibrillation for women was longer. But women were less to die on scene or en route to a hospital and less likely to receive pre-hospital termination of resuscitation. Conclusion: Further studies should be done on sex difference in pre-hospital treatments of OHCA. Similarly, adjustment should be made in treatments to help improve the outcomes and survival of women who suffered from OHCA.

Cerebellar Role in Fear Consolidation

Sneha M. Vaddadi
Sponsor: Diasynou Fioravante, Ph.D.
Neurobiology, Physiology & Behavior

Along with playing a role in motor control, the cerebellum is recently thought to be involved in fear memory consolidation. The project that I am working on explores this role of the cerebellum by perturbing cerebellar function and observing behavioral differences in mice during fear-conditioning to determine whether there is a difference in the learned fear response. Projections out of the cerebellum come from the deep cerebellar nuclei (DCN), which receive inhibitory input from the cerebellar vermis. Inhibition of the cells of the vermis should therefore perturb input to the DCN and subsequent DCN projection that are involved in fear conditioning. Injections of an AAV8 virus encoding inhibitory receptors (DREADDs) have shown extensive infection of cells in the cerebellar vermis. A significant decrease in activity in the infected cells has been demonstrated using path-clamp recordings, verifying the efficacy of the inhibitory DREADDs. Subsequent procedures involve injecting the AAV virus into a cohort of mice for fear conditioning to determine the effects of cerebellar function perturbation on behavior during learned fear protocols. A significant difference in behavior and fear response would demonstrate an association between the cerebellum and fear memory consolidation- further implicating the cerebellum in functions beyond motor control.

Identification of Transcription Factor-Binding Motifs Involved in Secondary Cell Wall Biosynthesis

Hannah E. Vahldick
Sponsor: Siobhan M. Brady, Ph.D.
Plant Biology

Plant cells are reliant on their cell walls for structure, protection and response to environmental stimuli. Of particular interest is the biosynthesis and deposition of the secondary cell walls (SCW) in the xylem, which is integral for water and mineral transport. SCW material is composed of cellulose, hemicellulose, and lignin, and comprises the majority of plant biomass. These components have significant implications in the biofuel industry. Elucidating the regulation of the biochemical pathway through which SCW biosynthesis occurs would allow for greater manipulation of SCW deposition. Working with the model organism *Arabidopsis thaliana*, we have identified many transcription factors (TFs) involved in the regulation of SCW biosynthesis. However, the way that many of these TFs affect gene expression remains unknown. These TFs have been shown to interact with multiple target genes involved in SCW biosynthesis. These TFs regulate expression by binding to short sequences of DNA often upstream from the target gene in the promoter region known as transcription factor-binding motifs. I will develop a program to identify transcription factor-binding motifs involved in the regulation of SCW biosynthesis. With this information a more complete model can be constructed, one which demonstrates the functionality of these TFs and their binding motifs.

In Vivo Observations of Laminopathy Mutant Lamin Protein Organization in *C. elegans*

Venecia A. Valdez
Sponsor: Daniel A. Starr, Ph.D.
Molecular & Cellular Biology

Lamin is a crucial protein of the nucleoskeleton that provides structural support to the nuclear envelope. Mutations in genes that encode for lamin have been linked to a large class of diseases termed laminopathies, which includes Emery-Dreifuss muscular dystrophy and Hutchinson-Gilford progeria syndrome. Lamin is a fibrous protein that is required for nuclear migration events. Defects in this function have been linked to laminopathies, but the mechanisms of how they are related to disease remain poorly understood. Vertebrates have three to four lamin proteins. The nematode *Caenorhabditis elegans* contains only one lamin protein, LMN-1, thus providing a simple model to visualize and study lamin *in vivo*. To visualize lamin *in vivo*, two GFP tagged lamin strains were created using CRISPR-Cas9. I conducted a viability assay and determined partial functionality for one strain in comparison to wildtype. In trying to create a better strain, I created two more constructs to insert GFP into two internal sites of LMN-1. By visualizing lamin, I can compare LMN-1 organization in wild type to strains containing a point mutant in lamin corresponding to known human laminopathies. These architectural observations of lamin will offer better understanding on how lamin function is altered in laminopathy patients.

Structural Characterization of Human Tumor Suppressor BRCA2

Jorge Vaquero
Sponsor: Wolf-Dietrich Heyer, Ph.D.
Microbiology & Molecular Genetics

Carriers of germline mutations in *BRCA2* have a significantly higher predisposition to develop breast, ovarian, and other cancers. BRCA2 plays a critical role in the repair of DNA double-stranded breaks by homologous recombination (HR), a high-fidelity repair pathway, to maintain genomic stability and prevent carcinogenesis. BRCA2 acts as a mediator to form a RAD51-coated filament whose formation is a key step in initiating HR. However, the mechanism of BRCA2 in the formation of this essential intermediate is not completely understood, since most of the available research has not been performed in the context of the full-length human BRCA2 protein. Using dual affinity chromatography, we have successfully purified full-length human BRCA2 protein. With the full-length protein we have begun structural studies of BRCA2 using single particle electron microscopy to generate a three-dimensional model. Our raw data show BRCA2 particles with homogeneous distribution, and have used different image processing programs to process our data set. We will continue to collect more data and conduct image processing to generate a low resolution initial model. This can be refined with higher resolution data to a quality three-dimensional model, which will form the foundation to understand the mechanism of BRCA2 action.

Cognitive Deficits, Neuroanatomical Changes and Altered Protein Expression in an Inducible Mouse Model of Fragile X Premutation and FXTAS

Candice M. Vieira
Sponsor: Robert F. Berman, Ph.D.
Neurological Surgery
School of Medicine

Normally, there are between 5-54 CGG trinucleotide repeats within the 5' UTR region of the *FMR1* gene. Expansion of this trinucleotide sequence to 55-200 leads to changes in *Fmr1* mRNA and FMRP protein levels and is referred to as Fragile X Premutation (PM). PM carriers can develop Fragile-X-associated tremor/ataxia syndrome (FXTAS), a late-onset neurodegenerative disorder. The neurological hallmarks of PM include intranuclear protein inclusions as well as brain atrophy. To examine the effect of the expanded CGG repeats in PM carriers, we selectively expressed an ectopic CGG repeat in neurons using a doxycycline-inducible mouse model. In this study, we utilized the Morris Water Maze navigation task to test spatial memory and procedural learning throughout varying groups of different CGG repeat length. Using stereological approaches, we measured cell populations in several neuronal structures, such as the hippocampus and thalamus. Lastly, we characterized protein expression through Western blot analysis, examining the effects of ectopic CGG repeat expression on various proteins associated with learning and memory. Results from this study will shed light on the role of the expanded CGG repeats on the etiology of PM and FXTAS as well as provide evidence for these inducible mice as a valid disease model.

Ethnic and Sexual Orientation Minority Status: Effects on Academic Self-Efficacy

Izabela Villanueva
Sponsor: Nolan Zane, Ph.D.
Psychology

Students of double minority status of ethnicity and gender have poorer mental health and academic performance than their peers (Gonzales et al., 2002). However, the impact of double minority status of ethnicity and sexual orientation on academic performance is unclear. This study examines the effect of the interaction between ethnic and sexual orientation minority status on academic self-efficacy, an important factor in student achievement (Bandura, 2006). Participants in this survey study were 381 students from an ethnically diverse university. Among these students, 314 (82.4%) were ethnic minorities and 39 (10.2%) students identified as sexual orientation minorities. While the effects of ethnic minority status and sexual orientation minority status on academic self-efficacy were not significant, the interaction of both ethnic and sexual orientation minority status had a significant effect on academic self-efficacy even after accounting for the negative effects of perceived campus hostility toward ethnic and sexual orientation minorities. Students who identified as both ethnic and sexual orientation minorities had an even lower sense of academic self-efficacy than their peers. These results highlight the need for further research on factors that impact academic performance among different double minority populations and enhancing student support services for marginalized groups.

A Computational Modeling Investigation Into SCN10A Linked Brugada Syndrome

Marcus Vincent
Sponsor: Colleen E. Clancy, Ph.D.
Pharmacology
School of Medicine

A functional role for the sodium channel $Na_V1.8$ in the heart is unclear. Mutations in SCN10A, the gene encoding $Na_V1.8$, have recently been linked to Brugada Syndrome. Brugada Syndrome is detected on an ECG by coved ST-segment elevation. Wild-type $Na_V1.8$ has been shown in recent studies to promote $Na_V1.5$ mediated current, two mutations in the SCN10A gene, R14L and R1268Q, result in a loss of cardiac Na_v function. We utilized a computational modeling approach to predict if mutation induced loss of function in the cardiac I_{Na} by R14L and R1268Q is a plausible mechanism of the Brugada Syndrome phenotype. We developed models based on experimental data and used these models to predict the effect of the mutations on cardiac cellular excitability and computed electrograms from simulated tissue. The model predicts that in the single cell, both two mutations result in major depression of cellular excitability. In the tissue level simulations, the predictions were very different, simulated tissue homozygous for either mutation resulted in complete failure of propagation. Our results suggest that the defects in the SCN10A gene that modify I_{Na} in the heart can explain the clinically observed phenotype in patients.

Anion Exchange Chromatography Paired With LC-MRM-Mass Spectrometry Allows for the Separation and Monosaccharide Composition of Charged Polysaccharides

Thai-Thanh T. Vo
Sponsor: Carlito B. Lebrilla, Ph.D.
Chemistry

While carbohydrates are known for being the most abundant biomolecule, it is difficult to both separate them chromatographically and characterize their monosaccharide composition. Polysaccharides have been successfully separated through ion exchange chromatography; however, the product is incompatible with Mass Spectrometry (MS) due to the high salt concentration required for elution. This project aims to develop a method to desalt the fractionated polysaccharides in order to take advantage of the sensitivity and selectivity that MS offers to the analysis of monosaccharides. Uronic acid containing polysaccharides are first fractionated by anion exchange Flash Column Liquid Chromatography (LC) before undergoing hydrolysis with trifluoroacetic acid (TFA), derivatization with 3-methyl-1-phenyl-2-pyrazoline-5-one (PMP), and cleanup with C18 Solid Phase Extraction (SPE). Each sample is subsequently analyzed by Liquid Chromatography-Multiple Reaction Monitoring-Mass Spectrometry (LC-MRM-MS) for monosaccharide composition. This study found that by derivatizing the monosaccharides with PMP, the added hydrophobic characteristics allow them to be retained on a C18 SPE column and the salt from the ion exchange can be eluted with water. This pairing of anion exchange chromatography with mass spectrometry will aid a diverse range of fields, such as food science, chemistry, and even biofuel production by enhancing our understanding of carbohydrate structures.

Improving Sustainability in International Development

Jillian Walke
Sponsor: Colleen E. Bronner, Ph.D.
Civil & Environmental Engineering

Engineers Without Borders (EWB) is a non-profit organization that partners with developing communities internationally to fulfill their engineering needs. Engineering solutions can be developed to face complex infrastructure challenges, but often the most difficult aspect is ensuring the project is sustainable in that it will support the community in need for a long period of time. Therefore, our objective is the improve sustainability across international development projects. In observing the outcomes of our international projects, we are able to draw conclusions about the sustainability of these engineering solutions. In looking at our past projects including gray water reuse in Guatemala, sanitation in Uganda, and water distribution in Bolivia, we yield evidence that achieving sustainability in engineering solutions requires constant monitoring of the system implemented. Research on this topic is continuous and the effect of consistent communication with the community on project sustainability is in focus. The results of this study may lead to improvements in international development project follow-up and closures.

The Ascension of Camden, South Carolina

Kyle J. Walsh
Sponsor: John Smolenski, Ph.D.
History

British forces suffered heavily from disease when they surrendered at Yorktown during the Revolutionary War in 1781. Despite the successful siege of Charles Town, South Carolina and subsequent military victories such as the Battle of Camden, British General Charles Cornwallis soon found himself overwhelmed at Yorktown with hundreds of his troops unable to take up arms. Bravery shown by British forces delayed epidemiological factors from influencing capitulations the previous summer at Camden. When General Cornwallis received word that American General Horatio Gates had advanced from North Carolina, he arrived at Camden to find nearly eight hundred men sick and unable to defend the cause. The dire situation encouraged Cornwallis to abandon the idea of a retreat and rally the remaining troops for battle. Widespread illness suffered by the British almost immediately following the siege of Charles Town drastically affected military operations. General Cornwallis arrived in Yorktown via a similar path to the Catawba Nation who fled the same region twenty years earlier in the face of similar epidemiological circumstances.

Early Signs of Decline in Everyday Cognition in Aging: Self and Informant Perceptions

Cathy Wang
Sponsor: Laurel A. Beckett, Ph.D.
Public Health Sciences
School of Medicine

Alzheimer's disease (AD) is a progressive brain disease with gradual onset, and patients typically report having cognitive problems years before clinical diagnosis. Our focus is on the early signs of disease and whether participants and their informants agree upon the incidence as well as the sequence of cognitive items that appear over time. We examine the Everyday Cognition (ECog) scale scores for 585 participants (185 normal controls, 100 with subjective memory complaint, 300 with early mild cognitive impairment) and compare them with those of their informants. The Mallows' model is used to characterize the distribution of sequences in which items from the ECog questionnaire first appear over time. There is partial but not complete agreement in the participants' and their informants' modal sequences of the memory, language, visuospatial ability, and divided attention domains. The participants notice memory and language decline before their informants, and for items that have the same onset, the participants give a higher severity rating than their counterparts. The difference in timing of onset may be due to the participants' sensitivity to their cognitive problems, and efforts to measure early performance decline could focus on operationalizing tests to detect these early signs.

Episodic Memory for Emotion Words

Yini Wang
Sponsor: Beth A. Ober, Ph.D.
Human Ecology

Emotion-laden words are words that are normed to be associated with a particular emotion. Previous studies have shown that there is a processing advantage for positive emotion-laden words in people's dominant language (Kazanas & Altarriba, 2015). In our study, we are investigating whether a positivity advantage exists for episodic recall, and whether it is larger for native speakers of English than for non-native speakers who began learning English at the age of 12. A list of orally-presented positive and negative emotion-laden English words will be presented three times followed by immediate recall trials, then short-delay, and long-delay recall trials, and a recognition trial. The number of positive or negative emotion-laden words the participants are able to recall will inform us which group has greater memory for positive or negative words. We predict that both groups will recall more positive than negative words, but the difference will be greater for native than for non-native English speakers. The results of this study will give a better understanding of the different effects of emotion-laden words in native versus later-learned languages.

Family Dinnertime Routines as a Moderator of Internalizing Problems in Food-Insecure Children

Daniel R. Weisz
Sponsor: Lenna Ontai, Ph.D.
Human Ecology

Food insecurity, the limited or uncertain ability to access nutritionally adequate foods, is associated with a higher incidence of externalizing and internalizing behavior problems in children, though the association with internalizing problems is less clear (e.g., Slack & Yoo, 2005). In addition, frequency of family dinners is negatively associated with high-risk behaviors among older youth (e.g., Fulkerson et al., 2006), suggesting that regular family mealtimes may provide a sense of cohesion that promotes psychosocial well-being and protects youth from behavior problems. However, whether regular family dinnertime routines act as a protective factor against internalizing problems in the face of food insecurity has not been explored. We hypothesize that family meals will moderate this relationship such that regular family dinnertime routines will protect against internalizing problems in children who experience food insecurity. The current study will use cross-sectional data from the Rural Families Speak about Health Study (n = 343), using the Child Behavior Checklist, Family Routines Inventory, and Six-Item Short Form of the USDA Household Food Security scales. We will use multiple regression to examine family dinnertime routines as a moderator of the association between food insecurity and internalizing behavior problems.

Seasonal Cues Induce Phenotypic Plasticity of *Drosophila suzukii* to Enhance Winter Survival

Jessica D. West
Sponsor: Joanna C. Chiu, Ph.D.
Entomology & Nematology

Drosophila suzukii is an invasive pest of fruit crops that has drastically expanded its global range in a short time, spreading to most areas in North America, Europe, and South America since 2008. In Oregon, where *Drosophila suzukii* populations must face harsher winters, we observed that flies collected in the winter are larger in size and darker in abdominal pigmentation when compared to those collected in the summer. We have successfully recapitulated these seasonal morph phenotypes using simulated summer and winter conditions in the laboratory, and observed that the winter morph showed increased survival at lower temperatures when compared to the summer morph. We therefore hypothesized that seasonal phenotypic variation in *D. suzukii* is associated with altered physiology and metabolism, leading to higher survival for overwintering individuals. To test this hypothesis and evaluate gene expression differences between the two seasonal morphs, transcriptome libraries were prepared from the summer and winter morphs for RNA sequencing. Interestingly, mRNA transcripts involved in DNA replication and growth were significantly down-regulated in the winter morph, suggesting that they may be entering a winter diapause. This work provides insight into the mechanisms of increased Drosophila suzukii survival during harsh winter conditions.

Impact-Based Droplet Printing With Piezoelectric Actuators and Microfluidic Cartridges

Brent W. Weyers
Sponsor: Tingrui Pan, Ph.D.
Biomedical Engineering

Droplet printing, in both academia and industry, has recently adapted to copious biochemical and biological applications. A novel, multiplexed impact printing system which is capable of single-droplet jetting, droplet multiplexing, and concentration gradient generation, has been prototyped and is presented here. This impact-based droplet printing platform is capable of controlling the volume of droplet deposition from approximately 23 picoliters to 10 nanoliters (around a 500 fold variation). The working principle of this prototype is a piezoelectric actuator which creates a physical stroke on an interchangeable microfluidic cartridge containing a deformable actuation membrane and a droplet printing nozzle. The driving voltage supplied to the piezoelectric actuator, the waveform shape of actuation pulses (dwell time), and ejection nozzle size restrictions synergistically regulate the volume of droplets generated by the device. Droplet printing with piezoelectric actuators offers high-precision control over droplet generation, eliminates dead volume, displays good biocompatibility, and allows for multiple channel expandability. Proof of concept tests and validation has been performed with general biological assays; suitably, this microfluidic droplet printing system could be of potential value to establish multiplexed micro-reactors for high-throughput life science applications.

Effect of the Business Cycle on Postsecondary Decision-Making

Joshua T. Wild
Sponsor: Giovanni Peri, Ph.D.
Economics

Each year, thousands of undergraduates across the United States are confronted with the decision of what academic field to pursue. They are often influenced by a variety of extrinsic factors, such as family pressures, quality of faculty, and research opportunities. However, one of the most glaring considerations for students is the likelihood of obtaining a career after graduation. Rather than examining which majors tend to lead to more lucrative labor market outcomes, which has been researched extensively, this study attempts to look at how fluctuations in the business cycle affect students' decisions regarding their majors. To achieve this, the analysis focuses on degrees awarded in each state over a 14-year span. The primary explanatory variable is a set of lagged state-level unemployment rates, which reflect the status of the economy at the time when students were making their decisions. When facing less opportune economic times, undergraduates tend to lean towards applied sciences, specifically engineering. More recently however, with a greater amount of academic options available than ever before, students are generally becoming more diverse in their decision-making.

Identification and Characterization of Genes for Bacterial Chemotaxis to the Plant Hormone Indole-3-acetic Acid

Justice Williams
Sponsor: Johan Leveau, Ph.D.
Plant Pathology

Pseudomonas putida 1290 (Pp1290) is a plant surface bacterium that has the ability to detect, swim toward, and catabolize indole-3-acetic acid (IAA), a plant hormone important for plant growth. The iac gene cluster that codes for the degradation of IAA has been characterized, but nothing is known yet about the genes that underlie Pp1290's chemotactic response to IAA. Just upstream of the iac gene cluster in Pp1290, we identified a candidate gene coding for a Methyl-accepting Chemotaxis Protein (MCP) and we hypothesize that this mcp gene is involved in IAA chemotaxis. To test this hypothesis, we are assessing chemotaxis of IAA non-metabolizing strain *P. putida* KT2440 carrying just the iac gene cluster or the iac gene cluster together with the candidate mcp gene. We already confirmed that PpKT 2440 carrying iac genes can grow on IAA but cannot use it as a chemoattractant. If we can confirm that the combination of iac and mcp confers chemotaxis to strain PpKT2440, it would be the first ever demonstration of a gene involved in IAA chemotaxis.

Exploring the Link Between Visual Short-Term Memory and Visual Attention in Infancy

Brenna Williams
Sponsor: Lisa M. Oakes, Ph.D.
Psychology

Infants' visual abilities change and develop dramatically over the period of the first postnatal year. The observed improvement in visual proficiency can be seen as an aggregated product of numerous changes in specific visual faculties, including attention, visual short-term memory, and visual search. To better understand the co-development of these abilities, we developed a procedure that assesses multiple visual processes. In the current study we examined 6-month-old infants' visual short-term memory using a one-shot change detection task consisting of two, three, or four colored circles. In this task, we examine infants' detection of a change in one of the items in the array. We assessed visual attention in the same infants using the Infant Orienting with Attention (IOWA). This task examines infants' abilities in visual spatial attention and saccade planning within different levels of visual competition. We are currently evaluating the relation between infants' performance in these two tasks to provide understanding into the potential relationship between visual attention and visual short-term memory across development in infancy.

How Single-Parent Households Influence Depressive Symptoms in Adolescents

Lauren Williams
Sponsor: Amanda E. Guyer, Ph.D.
Human Ecology

Previous research suggests that children raised in single-parent households have higher depressive symptoms than their peers due to economic stress (Gore et al., 1992). The present study examines whether family constellation across early adolescence (ages 10-14) predicts depressive symptoms at age 14 in a sample of 462 female adolescents from the Pittsburgh Girls Study using an analysis of covariance (ANCOVA). Participants were divided into three family constellation groups: 1) only lived with cohabitating parents (n=177); 2) only lived with a single parent (n=140); and 3) fluctuated between the two living situations (n=145). An ANCOVA was used to test whether these family constellation groups differed in depressive symptoms, controlling for the number of years the family received public assistance across ages 10-14 (M=1.97, SD=2.10), race (i.e., Caucasian, African America, Asian, Other) and age-10 verbal IQ (M=98.13, SD=18.04). A main effect for family constellation on depressive symptoms $F(2,456)=9.897$, $p<.001$) was found. Depression was highest in the household fluctuation (M = 7.42) group, followed by the single parent group (M=6.05) and the cohabiting group (M=4.85). This indicates the girls' family dynamics had a larger impact on their depressive symptoms than the household income alone.

In Response to AB 1826: How the Redirection of Food Waste From California's Landfills Will Alter Greenhouse Gas Emissions From Compost

Sequoia R. Williams
Sponsor: William Horwath, Ph.D.
Land, Air & Water Resources

Under California's new law AB 1826, composting of organic waste instead of sending it to landfills is intended to decrease greenhouse gas (GHG) emissions. The composting process also produces GHG's. However, through management these emissions can be reduced. Most composting facilities in California only have experience composting green waste (such as plant material and leaves). Because AB 1826 will lead to more food waste being composted, we are looking into GHG emissions from compost comprised of green waste alone compared to a green waste and food waste mixture. Using a modified chamber technique with a sweep gas, we collected GHG emissions from our compost experiments. Gas samples were removed from the chamber and transferred into evacuated vials for GHG analysis. We also measured temperature, oxygen and moisture content of the compost piles to ensure conditions were optimal for microbial activity. We will estimate the flux of GHG's from both composts to determine the impact of food waste on GHG emissions. The difference in GHG fluxes will be correlated with nitrate, ammonium and dissolved organic carbon contents of the composts as potential explanatory variables.

Changes of Nitrogen Sources Over Time in Forest Ecosystems: Examining $\delta^{15}N$ of Tree Cores

Joyce Wong
Sponsor: Benjamin Z. Houlton, Ph.D.
Land, Air & Water Resources

Nitrogen (N) limitation is common in temperate forests such as those found in the Coastal Range of northern California, thus inhibiting the ecosystems' ability to negate the consequences of rising atmospheric CO_2 emissions. Understanding the cycling of available nitrogen is crucial to predicting carbon storage in terrestrial ecosystems. Current models of nitrogen cycling focus primarily on nitrogen entering terrestrial ecosystems atmospherically. However, geological sources of N are often disregarded. To observe this, we will be studying tree cores, soil, and bedrock from temperate forests in northern California, specifically *Pseudotsuga menziesii* (Douglas fir) dominated systems. Known for roots that reach and penetrate bedrock, Douglas fir may be drawing nitrogen from bedrock in addition to drawing from soil. To compare, we will be using stable isotope $\delta^{15}N$ analysis for the tree cores to determine the trees' nitrogen sources during different periods of its growth. The soils and bedrock will also undergo $\delta^{15}N$ analysis to look at N levels across sites. The stable isotope analysis may demonstrate if the geological N pool is prevalent in nitrogen cycling along with the soil N pool, which is currently understudied.

Reimagining the San Francisco Waterfront: Industrial Cargo Hub, Empty Plot or Thriving Community? The Nature of Land Use Development

Andrea J. Wong
Sponsor: Julie Sze, Ph.D.
American Studies

This research examines controversies around the land use developments in San Francisco's Mission Bay where the Mission Rock Project sponsored by the San Francisco Giants and Chase Center, the new Golden State Warriors arena, are to be built. These multi-billion dollar projects will bring housing, retail, open space and another professional sports teams, the Golden State Warriors to the waterfront. Through this detailed case study, I analyze the role of sports teams in city building and the economic logic/conditions that allow for developments like these to take place. Through close readings of project plans, interviews, and maps, I examine how sports, identity, politics, nature and place co-create each other. In addition, I draw from the historical archive of industrial land use in that area. Reading the symbols alongside the economic/material factors that drive the projects illuminate how developers and sports team owners use images of nature and leisure to argue for their project, improve their brand and justify their profit seeking behaviors.

Health Benefits of Extra Virgin Olive Oil – A Literature Review

Suk Wah Wong
Sponsor: Selina Wang, Ph.D.
Olive Center

Olive oil is one of the commonly used ingredients in cooking in western countries and is also known as the staple oil used in the Mediterranean diet. Most consumers have heard about the health benefits found in olive oil, specifically extra virgin olive oil (EVOO). Nonetheless, many of them remain confused as to how EVOO can affect the human body physiologically. Although numerous health claims exist today, many of them lack the support of long-term and/or proper scientific data. In order to educate the consumers properly, we searched and sorted through the scientific literature to identify the top five health benefits of EVOO, such as protection against cardiovascular disease. This literature review will serve as a guide that assists the consumers in learning about the top five health benefits of EVOO and the findings that corroborate them, in addition to providing future research with directions for olive oil and health.

Effect of Msh4 N-Terminus Phosphorylation on Crossover Formation During Meiosis in Budding Yeast

Maria Angelica Wong Chang
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

The formation of crossovers is a critical step in meiosis--a crucial developmental stage of many organisms, including humans. Failure to form crossovers leads to reduced fertility and elevates aneuploidy. Both crossovers and non-crossovers are products of double strand break (DSB) repair. However, of a large number of DSBs, only one or two crossovers are formed per chromosome. One focus of our research is to understand how crossover sites are selected. Research in budding yeast has shown that stabilization of joint-molecule intermediates by recombination factors influences resolution into a crossover fate. An important pro-crossover factor is the MutSγ heterocomplex which consists of Msh4 and Msh5, homologs of the bacterial mismatch binding factor MutS. Our previous research has identified the phosphorylation of Msh4 during meiosis at regulatory sites at its N-terminus. In this work, we explore the N-terminus phosphorylation of Msh4 and its effect on crossover formation through tetrad analysis and genetic map distance. Our results suggest that Msh4 phosphorylation is an important step in crossover formation.

A Deeper Look into Marine Larval Development

Hailey J. Wright
Sponsor: Richard K. Grosberg, Ph.D.
Evolution & Ecology

Marine larvae are either planktotrophic (feeding), lecithotrophic (non-feeding), or facultatively planktotrophic (can reach metamorphosis using only egg reserves, but can also feed). Transitions between these developmental modes occur rarely, and have profound impacts on the ecological and evolutionary characteristics of a lineage. Egg size significantly effects larval development because large eggs contain more nutrients than small eggs. I conducted a study to document the developmental mode of the Caribbean sand dollar, *Leodia sexiesperforata*. I reared larvae from a variety of egg sizes under differing food treatments and measured their growth and survivorship. From three replicate experiments, I found a significant relationship between egg size and larval body size. Larvae that were starved longer were on average smaller than larvae fed immediately. Although none of the starved larvae survived to metamorphosis, they often still formed a rudiment (the internal structure that will develop into the juvenile). Other obligately planktotrophic larvae cannot develop this structure without feeding. I confirmed that *L. sexiesperforata* develop by obligate planktotrophy; however, they can survive starvation and develop further than other planktotrophs using only egg reserves. This species could represent an intermediate stage in the evolution of lecithotrophic development from obligately planktotrophic development via facultative planktotrophy.

Methyl Diethanolamine Grafted Nanofibrous Membranes for Efficient Bovine Serum Albumin Adsorption

Wanrong Wu
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Bovine serum albumin (BSA) has broad biochemical applications including enzyme-linked immunosorbent assay, immunoblots, and immunohistochemistry. Therefore, creating solid adsorptive materials for high efficient separation and purification of BSA is critical to meet the great demands in biotechnology and biopharmaceuticals industry. In this study, we report that highly carboxylated poly(vinyl alcohol-co-ethylene) (PVA-co-PE) nanofibrous membranes were fabricated by a combination of electrospinning and the methyl diethanolamine (MDEA) functionalization. Carbonyldiimidazole (CDI) was used as an active intermediate to promote the reaction between hydroxyl groups of PVA-co-PE and amine group of MDEA, and high grafting ratio of 25 wt% was achieved. The final chemical structure was also confirmed by using FTIR spectra. The adsorption performance of the product was quantitatively determined by using Bicinchoninic acid assay (BCA assay) and UV-vis spectroscope analysis. The resultant functional nanofibrous membranes exhibited a good integrated adsorption performance towards BSA, including a superior adsorption capacity of 220 mg g-1, fast adsorption equilibrium within 8 h, and good selectivity. The as-prepared nanofibrous membranes could be applied in preparation of protein purification device for a wide range of fields.

Role of Rad21l1 in Meiotic Female Maintenance Defects in Zebrafish

Na Xiong
Sponsor: Sean M. Burgess, Ph.D.
Molecular & Cellular Biology

Meiosis is a series of cell divisions resulting in four haploid gametes. Proper homolog pairing and synapsis are required for correct chromosome segregation, and changes in these interactions can lead to aneuploid gametes and downstream birth defects in humans. Cohesins are protein complexes that hold sister chromatids together and facilitate proper pairing and synapsis. Our lab has a mutant for a meiosis specific cohesin subunit, Rad21l1. When heterozygote *rad21l1* mutant zebrafish are incrossed, the sex ratio of the F1 generation homozygotes is skewed in favor of males indicating potential defects in the female meiotic program. Zebrafish can revert to males if they do not produce enough oocytes to maintain "femaleness". Interestingly, preliminary observations suggest that F2 homozygote *rad21l1* incross can produce offspring with normal sex ratios. To investigate if any generational or sex specific differences exist in the progeny of *rad21l1* heterozygote and homozygote incrosses, I will conduct crosses using WT, *rad21l1* homozygotes and heterozygotes, track and categorize the phenotypes of progeny from these crosses and raise those fish to adulthood to determine their sex ratios. Through this process, we hope to better understand the inheritance of *rad21l1* homozygous female maintenance defects and how this relates to female meiosis.

On Heroics: The Official National Narrative of Modern Chinese History

Karen Xu
Sponsor: Yuming He, Ph.D.
East Asian Languages & Cultures

The national narrative of modern China, not unlike the historical narratives of nations everywhere, contains elements of storytelling and natural bias deeply rooted in political, social, and cultural factors. It reflects a classic hero's story, of the people taking control of their own future; a patriotic, official statement of a nation rising from the ashes to build its way back to glory. Through the research of mediums such as museum exhibits, historical sites and ruins, and literary sources, I explore the purpose behind the creation of China's national narrative, and argue that it is the main power which endows the Chinese Communist Party with its "right to rule," specifically comparing it with Western historical sources and economic accounts. I claim as well that it is the acceptance of this narrative by the public, with both positive and negative effects, that has largely formed China's view of modern international history, and driven China to where it stands today on the international stage.

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Lei Ye
Sponsor: Nolan Zane, Ph.D.
Psychology

Traditional psychotherapy was created to treat upper-middle class White women in Western societies. While many individuals have benefitted from traditional psychotherapy, people from other backgrounds may not view traditional psychotherapy as an ideal treatment approach. For example, past research has shown that Asian Americans are three times less likely than European Americans to utilize mental health services (Matsuoka, Breaux, & Ryujin, 1997). This difference in help-seeking behavior may be explained by Asian Americans' tendency of adhering to Asian cultural values, such as the tendency of keeping negative information within the family. Beyond race/ethnic differences, socioeconomic status, and gender could influence clients' willingness to self-disclosure, these factors can potentially deter the optimal results of psychotherapy. The current study examines the relationship between certain demographic variables and self-disclosure among three-hundred sixty-six college students. Our results suggest that Whites, females, and those of higher socioeconomic status were more inclined to disclose to a friend and disclose distress in general compare to Asians, males, and those of lower socioeconomic status, respectively. Future research should focus on understanding the needs of diverse patient populations and incorporating their cultural values into treatment to provide more adequate and inclusive care.

Inflammatory and Immunosupressive Effects After Activation of the Aryl Hydrocarbon Receptor (AhR) in Macrophages

Krisha Yadav-Ranjan
Sponsor: Christoph Vogel, Ph.D.
Environmental Toxicology

The Aryl Hydrocarbon receptor (AhR) is a cytosolic ligand-activated receptor protein that binds endogenous and exogenous compounds such as 2,3,7,8,-Tetrachlorodibenzodioxin (TCDD) and dioxin-related compounds. The AhR has emerged as a regulator of innate and adaptive immune responses upon exposure to environmental pollutants, inducing pro-inflammatory signals and immunosuppressive qualities. The AhR has been well described to form heterodimers with the AhR nuclear translocator (ARNT). The AhR has been also shown to interact with other proteins and signaling pathways including NF-κB and the NF-κB member RelB. We used RT-PCR in evaluating expression of chemokines and transcription factors. LPS treatment and activation of AhR stimulates the expression of AhR target genes, including that encoding the inflammatory cytokine, IL- 1β. Cytokines and chemokines such as IL-1β, IL-8 and TNF-α are induced in activated macrophages. Cytokines can which activate signaling cascades that amplify induction of immunoresponsive cells like neutrophils and macrophages. This study provides insight about the molecular pathways of AhR activation that result in downstream inflammation or immunosuppression.

Photocatalytic Water Splitting With Suspended Iron Oxide of Varying Particle Size

Max T. Yeh
Sponsor: Frank Osterloh, Ph.D.
Chemistry

Solar-energy-driven water electrolysis is a solution currently being researched as a fuel alternative. To compete with other energy sources on an economic front, photocatalysis of relatively cheap and abundant materials comes to mind. One such material, iron oxide, is known to photochemically catalyze water reduction and oxidation under ultraviolet lighting in the presence of reagents. In this study, α-Fe_2O_3 (hematite) is suspended with sodium hypoiodite as the sacrificial agent, which aids in reducing chemical bias by isolating the fuel-forming half-reaction from complications between electrons and holes recombining. The suspension was irradiated with a xenon lamp, evacuated into a gas chromatograph (GC) under pressure bias from argon gas, to be measured for oxygen evolution, due to charge separation on each individual particle. Before and after each irradiation, each sample was assayed by a Zetasizer to measure particle size, which were controlled by varying washes and dormancy period. Preliminary results suggest washes to be useful for up to two washes, which provides the most oxygen evolved.

Prey Preference and Growth of Juvenile Sea Star Pisaster ochraceus

Jenna Yonenaga
Sponsor: Eric Sanford, Ph.D.
Evolution & Ecology

Preference and growth of organisms can be largely correlated with prey choice. The variables that influence organisms to consume certain prey species are based on the optimal foraging theory. Organisms will choose prey items that maximize energy yield and minimize handling time. We designed an experiment to test prey preference and growth rates of the sea star, *Pisaster ochraceus*. We used mussels, snails, and barnacles as our variable prey choices. We found significantly greater growth in treatments with snails over treatments with barnacles, and similarly with treatments of mussels over treatments of barnacles. We saw a trend that sea stars feeding on mussels consumed the greatest total biomass, followed by a diet of snails, with a diet of barnacles leading to the lowest biomass consumed. The juvenile *P. ochraceus* displayed optimal foraging techniques by choosing prey with the largest energy yield, in these scenario, mussels and snails. However, we were unable to see handling time, and based this variable on sessile nature of prey. These variables that account for optimal foraging show the importance of prey preference in populations. Understanding these optimal foraging techniques used can influence our ability to sustain recovering populations of sea stars due to global change.

SUMO Ligase RNF212 Is a Novel Regulator of Apoptosis

Kevin J. Yu
Sponsor: Neil Hunter, Ph.D.
Microbiology & Molecular Genetics

Control of the apoptotic signaling pathway plays an important role in the creation and proliferation of cancer cells. The discovery in the Hunter lab that defective oocytes can be rescued from apoptosis (atresia or oocyte culling) by *Rnf212* mutation mice has established a novel role for the RNF212 SUMO ligase in the apoptotic signaling pathway. My research goals are to gain further insight into the pro-apoptotic role of RNF212 by expressing the normally meiosis-specific *Rnf212* gene in somatic tissue-culture cells. Expression of RNF212 in HCT116 cancer cells was accomplished by molecular cloning techniques, and a cell proliferation assay indicated decreased proliferation. Flow cytometry will be used to assess the level of apoptotic cells induced following expression of *Rnf212*. If our results indicate that *Rnf212* induces somatic cells to undergo apoptosis, we will address which step of the apoptotic signaling pathway is influenced by RNF212 and whether SUMO modification is required. These studies will provide us with a deeper understanding of apoptosis and in the longer term may offer alternative treatment options for cancer.

The Influence of the 1964 New York World's Fair on the Design Ideologies of Robert Moses and Walt Disney

Bret Yourstone
Sponsor: James Housefield, Ph.D.
Design

This paper analyzes and contrasts the significance of the 1964 New York World's Fair for Robert Moses and Walt Disney, considering their contributions to the Fair in relation to their implementation of the practices and ideologies of environmental design. Both men's careers in design culminated at the Fair, but with very different results. The Fair represented the end of Moses's decades-long position as the unelected master planner and builder of New York City; he poured too many resources into the Fair that led it to be a financial disaster. On the other hand, Disney's experience at the Fair was a resounding success, and propelled him and his team to begin to explore a more prominent role in master planning and environmental design outside of the entertainment industry. Their ideas, developed while working with the major titans of American industry, converged at the "last great World's Fair" in the ultimate expression of mid-century "optimistic futurism."

Examining Ethnic, SES, and Gender Variations in Self-Disclosure Tendencies

Yetianyi Yu
Sponsor: Nolan Zane, Ph.D.
Psychology

Ethnic minorities, such as, Asian Americans, African Americans, and Hispanic Americans, are under-served by our mental health system. They are less likely to seek psychological help and to stay in treatment (DHHS, 2001). Traditional psychotherapy is dependent on the communication between the psychologists and their clients; client self-disclosure is the main way for psychologists to acquire information they need to accurately assess, diagnose and treat an individual. If certain clients are less willing to self-disclose, they may not view psychotherapy to be a valid option for treatment. This study examines self-disclosure tendencies among 366 young adults from diverse racial/ethnic, gender, and socioeconomic status (SES) backgrounds. The results indicate that Asians, males, and those of lower SES are less willing to self-disclose than Caucasians, females and those of higher SES, respectively. The results suggest that Asians, males, and those from lower SES groups may be less likely to use and remain in traditional psychotherapy due to their reluctance to engage in a critical treatment process, self-disclosure. Future research should focus on developing culturally competent methods that enhance self-disclosure, so that diverse populations can receive more effective mental health care.

Substituent Effects on Spiropyran Sensing of Glutathione

Jason H. Yun
Sponsor: Angelique Y. Louie, Ph.D.
Biomedical Engineering

Our research focuses on the development of Magnetic Resonance Imaging (MRI) contrast agents based on molecular switches attached to nanoparticles. Molecular switches such as spiropyrans (SPs) display remarkable "switchable" physical properties in response to environmental stimuli and have shown sensitivity towards glutathione (GSH). However, current molecular GSH sensors are limited by their selectivity towards GSH. While electronic and structural effects have been reported to influence sensitivity and selectivity, the effect of substituents on GSH sensing is not yet well understood. Herein, we synthesized a series of nine spiropyrans functionalized with electron donating, neutral, and/or withdrawing groups to investigate SP sensitivity and selectivity towards GSH using UV-visible spectroscopy. To illustrate GSH sensing, we report the preparation and characterization of spiropyran-based iron oxide nanoparticles (IONPs). Among the spiropyrans tested, the presence and position of electron donating methoxy groups influenced GSH sensing and the degree in which SPs sensed GSH, respectively. Attachment of methoxy functionalized SPs to IONPs were found to be highly sensitive and selective towards the GSH redox system. These studies will not only help in designing more selective spiropyran-based thiol sensors but also provide a better understanding of the properties of these sensors.

Online vs. Offline Daters: Differences in Attachment Styles, Personality Traits, and Types of Intimacy

Zoe C. Zaorski
Sponsor: Lisa L. Rapalyea, Ph.D.
Human Ecology

The purpose of this exploratory research is to address the current gaps and misconceptions in attachment styles, personality traits, and types of intimacy regarding people that engage in online dating. This study will compare online daters to people who have met others through typical routes (i.e. friends, family, the workplace, school, and church, aka offline dating). Another offline avenue is through concierge-style matchmaking (e.g. blind dates). This study explores differences between online and offline daters in attachment styles, personality traits, and types of intimacy. This project uses a confidential and anonymous online survey involving a projection of at least 100 participants to be recruited from client lists of matchmaking services. Participants will be answering some questions from the Big Five Inventory, Experience in Close Relationship Scale-Short Form, and State Adult Attachment Measure, as well as, items assessing demographic and family structure. Data will be analyzed using correlational and group comparisons methods to explore differences in characteristics between online vs. offline daters. This study expects to find differences between online daters and offline daters in attachment styles, personality traits, and types of intimacy. Exploring these potential differences is crucial because of the lack of research on online vs. offline daters.

Fluorescent Microscopy Reveals Interaction of Plant Pathogens With Plant Defense and Plant Cell Death

Shuya (Iris) Zhang
Sponsor: David G. Gilchrist, Ph.D.
Plant Pathology

The Gilchrist lab has identified a gene from tomato, called PR1, which blocks pathogen-induced cell death during infection and stops the disease. Using genetic transformation and fluorescence microscopy, my research objective is to determine timing and location of the expression of the PR1 protein in relation to the area where cell death is suppressed, the bacteria are present, and the disease symptoms are arrested. In the lab, I transformed two individual strains of *Pseudomonas syringae* pv *tabaci*, a bacterial pathogen of tobacco, with green fluorescence protein (GFP) or red fluorescence protein (dsRED). These two bacterial strains will be inoculated into tobacco plants transformed with a PR1-GFP fusion gene to visualize the physical location of the PR1 gene product and the transformed bacteria. Preliminary data from the inoculated PR1-GFP fusion plant with the untransformed pathogen revealed that accumulation of the fusion protein was restricted to the cell death-defined lesion margin. My future experiments will test the hypothesis that the bacteria are confined to the same cellular locations were the PR1 gene is translated into the death suppressing PR1 protein by simultaneously visualizing the differential overlapping fluorescence signals and map their respective locations by confocal fluorescence microscopy.

Functional Nanofibrous Membranes for Efficient Lysozyme Adsorption

Zheng Zhang
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Lysozyme, as a kind of alkaline enzyme, is capable of dissolving bacteria by rupturing its cell wall and overflowing the content, which has been widely used in anti- bacterial, anti-inflammatory, and anti-viral related applications. Therefore, novel adsorptive materials for simple, efficient, and high-throughput separation and purification of lysozyme are highly desired. In this work, we report a facile process to create carboxylate groups on surface-functionalized nanofibrous membranes under mild conditions for efficient adsorption of positively charged lysozyme. Pyromellitic anhydride (PD) is grafted onto poly(vinyl alcohol-co-ethylene) (PVA-co-PE) nanofibrous, providing the adsorptive membranes with large surface area and tortuous porous structure. The resultant functionalized PVA-co-PE membranes exhibited high lysozyme adsorption capacity of 320 mg/g^{-1}, which was obviously higher than previous reported adsorption materials. Moreover, the as-prepared membranes possessed a fast equilibrium within less than 6 h, which could be attributed to the high surface area of nanofibrous membranes. The as-prepared PVA-co-PE nanofibrous membranes provide not only a promising method for the purification of lysozyme, but also a versatile platform for development of nanofibrous membrane-based purification systems toward various proteins.

Multifactorial Experimental Design to Optimize Fibrin Gels to Promote the Anti-Inflammatory and Proangiogenic Potential of Mesenchymal Stem Cells

Dejie Zhou
Sponsor: J. Kent Leach, Ph.D.
Biomedical Engineering

Of the 7 millions patients diagnosed with chronic nonhealing wounds in the U.S. each year, half do not respond to current treatments. Mesenchymal stem cells (MSCs) produce endogenous molecules that promote wound healing and tissue regeneration. Compared to injection of cells alone, the delivery of MSCs in a biomaterial can further enhance their wound healing potential by promoting cell persistence and upregulating secretion of key bioactive factors. The purpose of this study is to optimize the biomaterial delivery vehicle to simultaneously enhance the proangiogenic and anti-inflammatory potential of entrapped human MSCs. We used a Design-of-Experiments (DOE) multivariable analysis to determine the interaction between four input variables (fibrinogen, NaCl, CaCl2, and aprotinin concentrations) by quantifying gel stiffness, degradation rate, and secretion of vascular endothelial growth factor (VEGF) and prostaglandin E2 (PGE_2). DOE results reveal that entrapping MSCs in fibrin gels formed with 16.4 mg/mL fibrinogen, 1.9 wt% NaCl, 26.4 mM CaCl2 and 500 KIU aprotinin enhanced VEGF and PGE_2 production 3 and 6 fold, respectively. These data demonstrate that a DOE-based methodology can be used to the determine fibrin gel formulations that enhance the wound healing potential of human MSCs.

Investigation of Biomineralized Scaffolds for Prolonging Osteogenic Markers in Mesenchymal Stem Cells

Christopher A. Zikry
Sponsor: J. Kent Leach, Ph.D.
Biomedical Engineering

Mesenchymal stem cells (MSCs) are promising for cell-based tissue engineering strategies due to their multi-lineage capacity and high proliferative potential. When used in bone tissue engineering, MSCs are typically exposed to osteoinductive soluble cues to drive these progenitor cells toward bone-forming osteoblasts. We recently demonstrated that osteogenic markers rapidly reduce upon the withdrawal of these soluble stimuli, motivating the need for alternative strategies to sustain the osteoblastic phenotype when cells are implanted into bone defects. We hypothesized that biomineralized polymeric scaffolds would provide an effective platform for sustaining the osteoblastic phenotype of MSCs due to its osteoconductive nature. Poly(lactide-co-glycolide) microspheres were coated with carbonated apatite by incubation in modified simulated body fluid (mSBF) of two concentrations: 1X and 5X, where 5X denotes 5 times higher ionic concentration than 1X. Scaffolds formed with 5X mSBF (PM 5X) exhibited nearly an order of magnitude more calcium content than 1X (PM 1X) or nonmineralized (NM) scaffolds. Upon removal of osteoinductive cues, human MSCs cultured on PM 5X scaffolds exhibited greater retention of osteogenic markers compared to cells on PM 1X or NM scaffolds. These data demonstrate the potential of materials-based strategies to prolong osteogenic potential of MSCs during bone formation.

Surface Modification of Poly(ethylene terephthalate) Fibers via Photo-Induced Radical Graft Polymerization

Jiahan Zou
Sponsor: Gang Sun, Ph.D.
Textiles & Clothing

Surface modification of synthetic fibers is an effective and important method to improve properties and/or introduce new functionalities. Radical graft polymerization has great potential to work on surface functionalization of chemically inert poly(ethylene terephthalate) (PET) fibers. Surface radical graft polymerizations initiated by UV irradiation have significant advantages such as simplicity, low cost and controllable operation with simple equipment. In this approach photo-active anthraquinone (AQ) derivatives are applied onto polyester fabrics through conventional dyeing where AQs that can serve as both colorants and photo-initiators will be evenly and uniformly embedded throughout the fabric. In this research the proficiency of AQ derivatives as photo-initiators for the proposed controlled photo-induced radical graft polymerization method on the PET surfaces is investigated. Effect of different methods of delivering AQ as photo-initiators on PET surface grafting efficiency is evaluated. Different monomer structures have been employed to analyze the feasibility of the proposed approach. Fourier transform infrared spectroscopy (FTIR) is used to characterize the grafted PET samples. Iodometry titration and gravimetric analysis are conducted to quantify the amount of grafted monomers on PET surfaces.

Kappa Opioid Receptor Functioning Associated With Stress

Mikaela Zufelt
Sponsor: Brian C. Trainor, Ph.D.
Psychology

Depressive symptoms and depression-like behavior can be a result of stress. Under stress, dynorphin is released and binds to kappa opioid receptors (KOR). When activated by dynorphin, kappa opioid receptors trigger a feeling of dysphoria associated with the development of depression-like behaviors. We investigated the effect of stress on KOR action using California mice (*Peromyscus californicus*). Stress was induced using social defeat. A forced swim test was used to measure depression-like behaviors. The mice were placed in water with a natural response to swim and escape from the water, so the time spent immobile was measured as an indicator of depression-like behavior. Mice were injected with either a KOR antagonist NorBNI, KOR agonist U50,488, or vehicle before testing. NorBNI was hypothesized to mediate the depression-like symptoms by blocking the binding of dynorphin to KOR. NorBNI blocked immobility in males, but not in females. Further testing with varying doses of NorBNI was done on *Mus musculus*. NorBNI continued to have anti-depressant effects on the males, but still no effect on the females. More testing of NorBNI on females will be conducted using different behavior tests. The results of this project could lead to effective novel sex-specific treatments of depression in humans.