Online Proceedings

SESSION 1C

HISTORIES OF POWER, SOCIAL DIFFERENCE, AND COMMUNITY FORMATION

Session Moderator: Ileana Rodriguez-Silva, History
228 MGH
1:15 PM to 2:45 PM

* Note: Titles in order of presentation.

In between the House and the City: The Architecture and Social Responses of Housing Projects in Theory and Practice
Angela Yang, Senior, Architectural Design
Mentor: Jennifer Dee, Architecture

"It is useless to consider the house except as a part of a community owing to the interaction of these on each other." This was the opening sentence to the Doorn Manifesto written by Team 10, a collective of architects in the 1950's who discussed the future of modern architecture and the modern city. My research begins with delving into Team 10's theories on urbanism and Aldo van Eyck's writings on the architect's role on modernization and the relationship between a house and a city. With those theories as the driving force of my research, I delve into the development of housing projects as architectural responses to political and social impacts and modernization. I begin with the rise of housing projects in Algeria and Morocco as colonialism has made Northern Africa the experimentation grounds of new architectural types that differ from the traditional casbah and impoverished bidonvilles. From there, I move to France and investigate the banlieue as a reaction to post-war migration into the city and how the architecture has fallen to the banlieue's socio-economic image. Using Team 10's utopian ideals, I address the successes and failures of the housing projects up to this point and examine how architecture can act as a solution instead of a reaction to urbanization and modernization.

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"There Will Arise Here a Jerusalem Blessed of God": Creating Catholic Identity in 17th-Century Quebec
Linnea Svensson, Junior, History, French, Pacific Lutheran University
Mentor: Jennifer Cavalli, History, Pacific Lutheran University

In the early seventeenth century, French Catholic missionaries arrived in the region of New France now known as Quebec intending to make Christians out of the Amerindian population. Over the next century and a half, the missionaries proceeded to build schools and hospitals and to establish their orders in the colony. Two of the Catholic orders that sent members were the Jesuits and the Ursulines. Both orders concerned themselves with the education and conversion of the Amerindians, mostly the Huron tribe. Through their missionary activities, they formed a nascent community of individuals with shared beliefs and purposes. A number of factors, including their geographic location, their connections to their founding orders back in France, and the particular social environment surrounding them caused the Jesuits and Ursulines to live and work differently from their counterparts in France. These differences caused the missionary community to develop a distinct identity. Using The Jesuit Relations and Allied Documents and the correspondence of Ursuline Mother Superior Marie de l'Incarnation, this research project examines the distinct identity missionary communities in New France developed. These sources record the daily activities of the Jesuits and the Ursulines in New France, while also revealing how individuals of each religious order understood their collective mission, which was characterized by interaction and cooperation between the orders. More universally, this project sheds light on how individuals form new communities and the way identities, even institutional identi-

ties, adapt to new environments.

SESSION 1K

PHILOSOPHY AND ETHICS

Session Moderator: Benjamin Hole, Philosophy
258 MGH
1:15 PM to 2:45 PM
* Note: Titles in order of presentation.

Open-Ended Cinema
Allison Renee Greer (Allison) Ross, Senior, Comparative Literature (Cinema Studies), Latin
Mary Gates Scholar, Mary Gates Scholar
Mentor: Jennifer Bean, Comparative Literature, Cinema and Media

Mikhail Bakhtin's concept of dialogics, emphasizing open-endedness and multi-referentiality, has emerged as a central construct for analyzing how literary texts are read. Rather than reducing terms into singularities, dialogics allows for multiplicity and simultaneity. In film, a dialogic structure is an equally impactful format that has the power to problematize a narrative. Through my research and an exemplification of theory, I will demonstrate that the development of multi-referential and dialogic narrative structure is both ethical and activist: encouraging conversation and thoughtful consideration of multiple positions simultaneously instead of monolithic acceptance of a single, dominant narrative. The ambiguity introduced by the dialogic structure challenges the traditionally held binaries and dichotomies which govern so much ethical discourse. The rational subject operating within a system which places conceptual priority on a-priori knowledge and deemphasizes particularized knowledge is oppositional to feminist ethics which prioritize the personal over the a-priori rational, reclaiming those traits held as traditionally feminine as the sphere of ethics. These two systems mutually reinforce a binary dialectic and generate a contextual/non-contextual, emotional/rational, female/male dichotomy. I argue the works of Nussbaum and Kant (exemplars of these philosophies) serve to generate false dichotomies. A dialogic discourse allows for formation of the self endowed with such qualities as allow marrying context to ratiocination without placing undue priority on one over the other, generating a conception of self which is intersectional and better able to work within ethical constructs in the real world without falling back on restrictive definitions of normativity which cannot extend to reality. Dialogics does not propose a new dialectic, thereby reinforcing this dichotomy, but rather generates a polyphony of foci and meanings, allowing for a nuance and simultaneity of discourses permitting one to fully negotiate the complexities of ambiguous situations without the impulse toward reduction which often threatens to accompany resolution.

SESSION 1N

MCNAIR SESSION - EXPLORING THE NATURAL WORLD: FROM NUMBERS TO NANOPARTICLES AND BATS TO BACTERIA

Session Moderator: Todd Sperry, Office of Minority Affairs & Diversity
287 MGH
1:15 PM to 2:45 PM
* Note: Titles in order of presentation.

Rheological Characterization of Polymer Solutions with Nanoparticles
Jordan Kennedy, Junior, Mechanical Engineering, Montana State University
McNair Scholar
Mentor: Jennifer Brown, Chemical and Biological Engineering, Montana State University

Xanthan gum (XG), a biopolymer excreted by bacterium *Xanthomanoas campestris*, is used in pharmaceuticals, cosmetics, agricultural products, food products, industrial products, and is used in enhance oil recovery processes because of its properties as a thickening agent, dispersion agent, and stabilizer of emulsions and suspensions. Locust bean gum (LBG), a polymer extracted from the seeds of the carob tree (Ceratonia siliqua), is of interest in the biopharmaceutical field as a medium for oral drug delivery. With the addition of nanoparticles, the material properties of the polymer solutions can be significantly altered. Understanding of polymer-particle interactions and their impact on the material response to shear through rheological measurements is necessary for targeted design of material properties for specific applications. Flow and oscillatory testing was performed on XG and LBG solutions with and without the addition of silica dioxide (SiO_2) nanoparticles. Under constant shear, XG solution shows a shear thinning behavior typical of weak gels. With the addition of nanoparticles, the shear thinning behavior of XG is still present but at an overall higher viscosity. LBG shows shear thinning behavior with a Newtonian region at lower shear rates. The addition of nanoparticles to solution shows a region of shear thickening at lower shear rates and shear thinning behavior at higher shears at a considerable higher overall viscosity than the LBG solution without nanoparticles. When strain is held constand with increasing frequencies, the storage (G') and elastic (G") modulus show that XG has a tendency of more elastic behavior than LBG. The addition of nanoparticles results in more viscous solutions with a higher elastic response. LBG behavior is mroe

heavily impacted by the addition of SiO_2 nanoparticles than XG.

SESSION 2Q

INTERSECTIONS: ART, CULTURE, TECHNOLOGY, PHYSICALITY

Session Moderator: Jennifer Salk, Dance
389 MGH
3:45 PM to 5:15 PM

* Note: Titles in order of presentation.

In Pursuit of Posture: The Fallacy of the Straight Spine
Rachel Jean (Rachel) Morin, Senior, Dance, Biology (General)
Mentor: Jennifer Salk, Dance

What is a "straight" spine? What do people mean when they refer to a straight spine in a dance class? Are they talking about a lengthened spine, which can represent a well-supported postural alignment? Unfortunately, an instructor's improper use of language can often lead to a student's misinterpretation, resulting in injuries and life-long alignment problems including less efficient and dangerous movement patterns. Posture and alignment are an important part of every dance class, as they instruct not only how dancers carry themselves, but also how they prepare for and react to movement, however, verbal postural cues vary widely, and have differing amounts of success in achieving a healthy postural alignment in students. By observing classes of multiple levels, styles and ages I have gathered information regarding the language used by dance instructors to describe posture in the classroom. This research, combined with information from dance literature, and clinical language used by physical therapists has allowed me to determine that some verbal cues are more effective than others in eliciting a healthy supported spine in the classroom.

POSTER SESSION 3

MGH 241, Easel 151
2:30 PM to 4:00 PM

Growing with Auxin
Anisa Noorassa, Senior, Biology (Molecular, Cellular & Developmental)
Mary Gates Scholar
Julia Weisbrod, Junior, Biology (Molecular, Cellular & Developmental)
Mentor: Jennifer Nemhauser, Biology
Mentor: Britney Moss, Biology

Auxin is the plant hormone, guiding phototropism, gravitropism, cell elongation, cell division, cell determination, and a host of other processes. Plant cells respond to auxin by turning on certain genes. When auxin enters the cell, it binds to a receptor protein; this receptor then binds to a repressor protein which typically prevents expression of auxin genes. This interaction triggers repressor breakdown and gene expression. We are investigating auxin-induced interactions between the receptor and repressor proteins (IAA's). In our model plant, Arabidopsis, there are 29 IAA repressor proteins and 6 receptor proteins. Some combinations of repressors and receptors are known to result in differential degradation of the repressor; other interactions do not seem to lead to degradation. Our data suggests that receptors AFB4 and AFB5 cannot degrade repressors. This could be because AFB4/5 do not interact with the repressors (hypothesis 1) or because their interaction with the repressors does not trigger degradation (hypothesis 2). We are testing these hypotheses by examining repressor/receptor interactions in Arabidopsis proteins expressed in budding yeast cells. To address hypothesis 1, we are using a yeast two- hybrid assay to investigate the strength of interaction between several IAA repressors and the AFB4/5 receptors in the presence of auxin. To address hypothesis 2, we will determine whether IAA: AFB interactions identified at the yeast two-hybrid assay lead to repressor degradation. We have tagged the IAAs with yellow florescent protein and will co-express them with AFB4/5 in yeast. Flow cytometry will be used to measure changes in florescence levels upon addition of auxin. The next step will be to confirm these findings in plants. Understanding the variation in auxin repressor/receptor interactions brings us a step closer to understanding how auxin drives so many different plant behaviors and responses.

POSTER SESSION 3

Commons East, Easel 83
2:30 PM to 4:00 PM

Do Physiological Levels of Human Hepatic Lipase Reduce the Development of Atherosclerosis?
Dean Ricks (Dean) Spencer, Senior, Biochemistry
Mary Gates Scholar
Dongyang Chen, Senior, Applied Music (String Instruments)
Mentor: Helen Dichek, Pediatrics
Mentor: Jennifer Lam, Pediatric Endocrinology

Atherosclerotic cardiovascular disease is the leading cause of death in North America. Hepatic lipase (HL) a liver enzyme that hydrolyzes lipoprotein triglyceride, plays a critical role in lipid metabolism and may influence the development of atherosclerosis. Hepatic lipase may serve dual roles in the development of atherosclerosis: 1) HL may be pro-atherogenic by converting low-density lipoprotein (LDL) to small-dense LDL, causing build up of cholesterol in arteries. 2) HL may be anti-atherogenic by increasing the cholesterol-

poor form of high-density lipoprotein (HDL) that removes cholesterol from the arteries, decreasing build up of cholesterol in arteries. Previous studies have reported that elevated levels of human hepatic lipase (hHL) reduce the development of atherosclerosis. However, those studies were done in transgenic mouse models with supra-physiologic levels of hHL and may not accurately reflect the role of physiologic levels of HL on atherosclerosis. Therefore, we created a physiologic model of hHL expression to analyze the role of hHL in the development of atherosclerosis. This "humanized" mouse model expresses hHL at physiologic levels in the liver. We hypothesize that physiologic levels of HL will reduce the development of atherosclerosis compared to mice lacking HL. To test this hypothesis we bred the transgenic hHL mice onto a low-density lipoprotein receptor knock out background (which is an established model for atherosclerosis). Littermates with and without the hHL transgene were fed a high-fat, cholesterol enriched ("Western") diet to accelerate atherosclerosis development, after which the aortas were harvested, dissected longitudinally, and pinned to expose the inner aortic walls for visualization. Cholesterol buildup was stained and the ratios of atherosclerotic accumulation to total aortic surface area were quantitatively measured via Adobe Photoshop. Results from this study will clarify the contribution of hHL to atherosclerosis development. Ultimately, our results will guide the development of new treatments to prevent and treat atherosclerosis.

POSTER SESSION 4

Commons East, Easel 47

4:15 PM to 5:45 PM

Characterization of *arf2-9* Mutant in *Arabidopsis thaliana*

Yingying Li, Junior, Biochemistry
Mentor: Anahit Galstyan, Biology
Mentor: Jennifer Nemhauser, Biology

Auxin is one of the most important plant hormones that regulates almost every developmental process during plant life cycle. Auxin response factors (ARFs), are DNA-binding transcription factors that regulate auxin-mediated transcription by activation or repression. In *Arabidopsis*, ARFs are encoded by a family of 28 genes, and each member is thought to play a central role in various auxin-mediated developmental processes. ARF2 has shown to be a transcriptional repressor. Nemhauser lab uses Arabidopsis seedling hypocotyl, the embryonic stem, as a model to study growth. Loss of ARF2 alters hypocotyl growth in Arabidopsis seedlings. *arf2-9* is a single point mutation in DNA-binding domain that results in loss of ARF2 function. I have analyzed the hypocotyl growth in *arf2-9* mutant in presence and absence of exogenously applied auxin. The results indicate that *arf2-9* exhibits longer hypocotyl in comparison with wild type seedlings not only in control untreated condition but also in response to auxin application. This data suggests that ARF2 is a negative regulator of hypocotyl elongation. To investigate the mechanisms how ARF2 regulates hypocotyl growth and elongation, I have crossed *arf2-9* mutant with a reporter line P_PKS4::GUS that marks actively growing hypocotyl region. I have used dCAP genotyping method for *arf2-9* single point mutation and Basta resistance selection for P_PKS4::GUS transgene to isolate double homozygous *arf2-9* X P_PKS4::GUS plants. My hypothesis is that long hypocotyl in *arf2-9* is a consequence of indeterminate growth. Given that, my prediction is that GUS staining pattern of P_PKS4::GUS will be different in *arf2-9* genetic background compared to the original line. This includes possibility of having GUS staining in different regions of hypocotyl or extended staining pattern over the time when in wild type background P_PKS4::GUS marker is no longer active. Those differences will help us understand the function of ARF2 better.

POSTER SESSION 4

Commons East, Easel 45

4:15 PM to 5:45 PM

The Effects of Modifying IAA28 Degradation Rate in Lateral Root Formation in *Arabidopsis thaliana*

Autumn M. (Autumn) Walker, Senior, Biology (General)
Mary Gates Scholar
Mentor: Jennifer Nemhauser, Biology
Mentor: Jessica Guseman, Biology

Essentially all growth and developmental processes in plants require action of the hormone auxin. Auxin regulates gene expression by mediating the degradation of repressor proteins called IAAs. A subset of IAA proteins are involved in the initiation of new lateral roots, which are important for overall root architecture and function. Members of the Nemhauser lab have shown that proteins within this subset from *Arabidopsis thaliana* have varying auxin-induced degradation rates, using degradation assays in a heterologous yeast system. I hypothesize that differences observed between the degradation rates of the IAAs contribute to the specificity and diversity of auxin responses. When one of these lateral-root expressed IAA genes, IAA28, is mutated so that it is completely unable to be degraded, the plant does not form lateral roots. I predict that small changes to the degradation rate of IAA28 will lead to differences in plant phenotype, specifically the developmental stages and numbers of lateral roots that develop, as is suggested by preliminary data from work with IAA14. Currently, I am engineering and testing modified versions of IAA28 with the goal of obtaining a range of degradation rates. It is difficult using plant-based system to measure the degradation rates of modified IAA28 proteins due to feedback and the inability to control auxin. To test the degradation rates of modified versions of IAA28, I am ex-

pressing them in the yeast, *Saccharomyces cerevisiae*. Once I have obtained a cohort of modified IAA28 proteins that display a range of degradation rates, I will transform these proteins into plants. I predict that my observations of plant phenotypes will allow me to determine whether the precision of IAA28 degradation rates matters. The results of my research may partially explain the importance of the differences between IAA degradation rates in determining specificity of auxin response phenotypes in the plant.