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ADELANTE



A JOURNAL OF STUDENT RESEARCH AND CREATIVE WORK

*¡El querer es poder!
Where there is a will,
there is a way!*

Adelante: A Journal of Student Research and Creative Work

Volume 2: Fall 2022

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We acknowledge and are mindful that Chico State stands on lands that were originally occupied by the first people of this area, the Mechoopda, and we recognize their distinctive spiritual relationship with this land, the flora, the fauna, and the waters that run through campus.

We are humbled that our campus resides upon sacred lands that since time immemorial have sustained the Mechoopda people and continue to do so today.

From the Editor Alondra Adame



I am fortunate to be able to return to Adelante after earning my master's degree in English from Chico State and even having the opportunity to teach as a lecturer for a short while! My own learning experiences and teaching experiences have only reinforced how much I believe the Adelante program is an amazing resource for our students. The journal is only one of the many opportunities that provide Chico State students with an enriching experience that supports their academic journey and helps them gain confidence and pride in their work. I hope this second issue can function as a testament to Adelante's impressive growth over the past couple of years.

The papers and abstracts being presented in this journal are teeming with talent, hard work, and passion for the various subjects that these students have thrown themselves into. It is so important to provide research opportunities for students to explore and learn more about themselves as academics.

I hope when readers spend time with the work featured in this journal that they will imagine these students working in the various places that this important intellectual work often happens: in the offices of supportive and compassionate faculty mentors, in dorm rooms and apartments, at their work desks during their breaks, in the corners of Meriam Library, in the front seats of their cars before class, and so many other small nooks and crannies of their lives. Busy students take what they can get and they make it work in the most amazing of ways. This journal and the work I've put into it are meant to highlight these noble efforts. I thank every contributor for their final products but also all of the energy, sweat, and tears that have undoubtedly gone behind them.

To the Adelante crew, to the student contributors, to the faculty mentors, and to anyone who will step forward in the future, please continue to do the work that matters to you. It matters to me and I am certain that it matters to others but what matters most is that you care about it with all your heart. Vale la pena.

Alondra Adame

From the Co-Editor Natalie Lawlor



faculty mentors here at Chico State worked so hard on to develop. Chico State has extremely bright and talented students who are making fantastic contributions to their respective fields of research.

I feel so lucky to have had the opportunity to assist in the development of this research journal, and I am so excited for the exemplary work in this journal to be displayed.

Natalie Lawlor

Hi there! My name is Natalie Lawlor, and I graduated from Chico State in 2022 with a master's degree in psychological science.

Working on this journal with all of the wonderful staff of the Adelante program has been such a joy and an experience I am very grateful for.

It was incredibly fulfilling to be able to read all of the amazing pieces of research submitted to this journal that the students and their

Origins

The goal of *Adelante**: *A Journal of Student Research and Creative Work* is to showcase the breadth and diversity of Chico State undergraduate and graduate student research and creative work.

The idea for the journal grew out of our desire to provide examples of student work that demonstrate a wide array of methods, styles, and diverse voices. We hope the journal inspires more students to engage in research and to pursue opportunities to present and publish their work in this journal and beyond.

The student journal is edited by graduate students wishing to learn about the peer review process, editing, and publishing academic research. In addition to establishing a competitive, peer-review process to select and publish a small number of high-quality, finished papers, we also wanted to include shorter pieces that allowed all student researchers to publicly share at least some part of their work.

For this reason, we encouraged students to submit abstracts that captured their research and creative work. All of our authors had an opportunity to work with us to edit and format their work.

In addition to the completed papers and abstracts, the journal includes student-author photos and biographies. We also thought it was important to recognize and highlight the faculty who provide the opportunities and mentoring necessary to ensure our students' success. We included their photos and biographies, too. Finally, we included in the journal a research and writing resource guide to share with students beginning or continuing their research journeys.

We are pleased with this second edition. We believe it once again meets our goal of showcasing our students' research and creative endeavors and the dedicated faculty who support them. In future editions, we hope to expand the journal to provide even more opportunities for students to showcase their excellent work.

—Adelante Editors

*Note: "Adelante" is Spanish for "Onward, Ahead, Forward!"

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The Adelante program's core mission is to support Latinx and low-income students at Chico State to explore, prepare for, apply to, and successfully attain graduate degrees and teaching credentials.

It is a multifaceted program and includes a graduate student ambassadors outreach program where information about graduate education is provided to undergraduates, a peer-plus mentoring program where graduate students mentor undergraduates, and a summer research program that pairs undergraduate and graduate students with faculty mentors to conduct research.

Cover Art and Designer



About the Artist

My name is Stephanie A. Smith and I identify with she/her pronouns. My majors are religious studies and social science-multidisciplinary. I look forward to following through to a master's program after I earn my bachelor's degree. I am a distance student studying online from Trona. Trona is a small town at the southwest corner of Death Valley that is classified as a ghost town, which I think is pretty neat. As an artist, I love to get lost in being creative. I have learned many types of artistic techniques, but my favorite pastime is painting. Painting is important to me because it emotionally connects me to my French and Mexican ancestry and is a time when I can contemplate the world around me without pressure. I prefer to work in traditional styles and techniques using bold colors. Submitting my painting to Adelante was a big step as I have never previously entered an art contest. But, by following the link to

the advertisement in the school announcements, I found a wonderfully encouraging and diverse atmosphere that is as inspiring as it is reflective of the community. Community, like a shared meal, is nurturing and so I offer you my simple "Comfort Food."

Comfort Food celebrates kinship and home, friendship, and sharing. Food is central to life and community. The price of food may be on the rise, but the pricelessness of breaking bread together cannot be measured. It brings people together, creating conversation and shared experience. Food is a cultural expression of love that is best enjoyed when shared.



Stephanie A. Smith
Comfort Food
Acrylic on paper, 12" x 9"

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<https://www.csuchico.edu/adelante/researchers-program/adelante-electronic-journal.shtml>

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STUDENT PAPERS

This is a critical introduction from a thesis project: a creative nonfiction collection of personal essays titled The Audacity to Live. The critical introduction is an interrogation of the student's work with a focus on creative influences, craft influences, and market considerations. The author was an English graduate student, and their faculty mentor was Professor Rob Davidson. This paper utilized the Modern Language Association (MLA) Style, which is typical for papers in this discipline and used in-text citations.

The Audacity to Live: Critical Introduction

Alondra Adame

Introduction

The Audacity to Live is a collection of essays that interrogates larger questions and ideas about identity and culture from my queer Chicana perspective. Most of these essays jump around chronologically but are threaded together by the character of Alondra who is always vividly recounting a memory, providing critical cultural analysis, or looking forward to future possibilities. The character of Alondra switches from essay to essay depending on the topic at hand: a young child questioning the Catholic faith; a teenager searching for a sign about her future; and a young adult with a deeper understanding of where she comes from and who she wants to be. The format of the personal essay allows different threads to emerge in each version of Alondra in order to analyze societal and cultural issues.

The personal essay form, according to leading practitioner and writer Phillip Lopate, is informal with a focus on “intimate style, some autobiographical content or interest, and an urbane conversational manner” (Harmon qtd. in Lopate *The Art of the Personal Essay* xxiv). Lopate was also a vital voice in understanding the personal essays I was writing. The tone and style of a personal essay are what initially interested me about the form. While the personal essay aims to highlight select moments in scenes and includes a narrator and reflection like a memoir would, it also asks the writer to contextualize their experiences and analytically address larger ques-

tions about culture and society. In order to do so, a writer must become a reliable voice for the reader, one that captures the intimacy that Lopate points out as “the hallmark of the personal essay” (*The Art of the Personal Essay* xxiii). My thoughts, memories, desires, and complaints from my young adulthood are tools to set up a relationship with my readers in order to bring them closer to the heart of the matter I’m trying to show them.

Creative Influences

I find myself inspired by writers like Jennine Capó Crucet and Cathy Park Hong who write about their experiences in broader societal and cultural scopes and had the most significant impact on how I view “the self” and identity in personal essays.

Jennine Capó Crucet: Identity & Resistance

Jeannine Capó Crucet’s essay collection, *My Time Among the Whites: Notes from an Unfinished Education*, acknowledges the otherness that women of color feel when isolated within predominantly white communities and the struggles experienced by first-generation college students as well as children of immigrants. Crucet positions herself in her essays through the lenses of her various identities: Cuban, American, Floridian, student, professor, writer, daughter, and divorcée. Her identities are positioned in order to add meaning and perspective to certain experiences like her trip to Disney World.

Crucet carefully centers her first-person point of view as a Cuban-American Florida native to enhance the themes of fantasy and reality as she makes connections between Disney World and the American Dream in her essay, “Magic Kingdoms.” Crucet’s analysis of her 2017 trip to Disney World is given to the reader through her parents’ teasing where they wondered “why they’d let [her] go to college in the first place if all it made was a person who who could no longer enjoy things, who could no longer easily engage in the version of fantasy Disney provides... without giving them a lecture on *consuming and being consumed*” (Crucet 46). Crucet’s college education taught her to perceive oppression in its more subtle forms, even in a place she once held dear when she was a child.

Crucet claims that Disney “excludes and erases who you truly are” in order to keep guests interested in returning, creating a singular whitewashed American fantasy that is inaccurate and damaging for the guests who participate in this illusion (Crucet 50). Crucet reinforces this idea with an anecdote about a white American family, analyzing the father’s failure to acknowledge “the misogyny and violence” (52) being represented in the Pirates of Caribbean ride as well as her own failure to say something about it. She is constrained by financial and societal concerns and frets over the cost of the trip as well as the time invested. Ultimately, Crucet decides to allow the misogynistic cycle to continue despite her feelings in order to maintain the Disney fantasy. The vulnerability of the children as well as the predatory nature of capitalism create a crossroads that Crucet could not navigate, and she ends the section with a helpless reflection on the unique control Disney’s design has over the people who participate in their business.

Crucet recognizes that Disney provides whitewashed American fantasies that people,

especially first-generation children, can mold themselves into. The theme park’s inherent whiteness erases children like herself who already felt untethered by an idealized Cuba concocted by their immigrant parents and also amplifies the reality of living in American “water, mud, and factories” (Crucet 59). Disney convinces children from a young age to believe in pure magic where everything is perfect as long as you believe in their particular version of a dream.

While Disney’s magic isn’t real, people will continue to pay into Disney’s branded fantasies for the memories and happiness it can bring them in a capitalistic American society. This point Crucet makes is further emphasized in the final section of the essay where her niece’s disgust during her first Disney visit is hilariously apparent. Despite the two-hundred-dollar photography service offered by Disney, Crucet’s niece successfully ruins the make-believe spectacle in front of one of Disney’s most iconic images, Cinderella’s Castle, by making facial expressions that mimic “melting or actively shitting her diaper” (Crucet 67). The two-year-old’s disinterest is presented by Crucet as a rebellious statement against the “branded version of generic white American happiness,” offering a more hopeful tone for the next generation’s relationship with the Magic Kingdom and finding their own versions of happiness in the United States (Crucet 67).

Similar to Crucet’s act of positioning her identity in the heart of the situation, I position myself in “Homecoming” with my first-person point of view as an ex-resident of Sutter, tracing the colonization of the land as well as the migration and brief history of my family in Sutter. This expands further into my perspective as a resident of Chico and a citizen of the United States, actively fighting and protesting against cycles of racialized violence. This attention to the first-per-

son point of view is present in almost every essay in my collection except for “Letter to My Teenage Self.” While many of my essays are centered around my perspective to give readers the “intimate voice” necessary to gain their trust and attention, “Letter to My Teenage Self” is written in the second-person point of view and recounts my awakening as a writer through an epistolary form. I was especially attached to the echoing quality of one of the final lines of the essay: “You will. You will. You will” (Adame 55). The echoing quality felt like it enhanced the meaning behind the essay, a more experienced adult Alondra who has become a writer reaching backward in time to try and reassure a more inexperienced teenage Alondra who hadn’t quite realized her potential yet.

A common theme in my work emerged around being seen as well as seeing myself which intertwines with some of the main conflicts present in the collection about expectations from different levels of society. I spent a moment in “Homecoming” examining different versions of myself, before and after moving to Chico after high school, “up to a microscope and saw the same core desire: to be accepted” (Adame 60). I wrestled with meeting expectations in a predominantly white area but moved past those expectations after high school by leaving for college, highlighting these changes through interactions with Hudson or with Timarie (Adame 61; 63-64). I also write about how at a party I felt “terrified that someone might look my way and see me for who I really was... I was from here and raised here, but has always been an outsider, even now” because I was always afraid of being perceived in multiple ways that I knew weren’t acceptable in my pocket of society growing up (Adame 62). However, the mention of the satirical Swift essay from high school is meant to represent a quiet, unseen resistance while the final moment in the essay during the protest represents a shedding of that quieter self for

an Alondra who can vocally and physically advocate against the racism for herself and others (Adame 65; 67).

I take on many identities in my essay collection that become starting points for social analysis and help center the focus of the work: queer, Chicana, daughter, sister, student, protestor, writer, friend, partner. I connected the racialized tension in the United States during the 2020 election to the tension I felt in my hometown after contextualizing Sutter through my own personal experiences in order to show the deep-rooted attitudes of rural conservative Northern California. Part of my inspiration for this essay was thinking about the ways people outside of California have an expectation of it being a liberal paradise of some sort. This idea evolved into an essay that confronted colonization and racism by weaving together my personal experiences, the history of the town and its founder, and the political climate during the 2020 Election. I try to end the essay with a hopeful tone in the face of racism that exists on a local and national level by painting the scene of my partner and I protesting together in downtown Chico (Adame 67). My resistance is more overt in “Homecoming” than the other essays and reflects the main themes about independence and growth throughout the collection.

Cathy Park Hong: Exploring Lineage & Identity

Cathy Park Hong’s *Minor Feelings* focuses on larger themes of race and culture through her identity and experiences as an Asian American woman. Her work often feels like a mix of literary journalism, memoir, and theory. By pulling on so many threads, Hong’s episodic storytelling structure upholds a rigorous and complex thought process to make sense of her own feelings of shame connected to race and culture. These feelings of shame are connected to the even greater themes in the

book about racialized emotions and living in a racialized America.

In her essay “Bad English,” Hong rationalizes her usage of the modular essay because she is “only capable of ‘speaking nearby’ the Asian American condition, which is so involuted that I can’t stretch myself across it... which is why I have chosen this episodic form, with its exit routes that permit me to stray. But I always return, from a different angle, which is my own way of inching closer to it” (Hong 103-04). Hong positions herself here as a reporter rather than a spokesperson for Asian Americans. She can give her own part of the experience but she aims to approach the subject from different perspectives and voices. The modular essay allows her to hop from her story about being bullied for her bad English to her father’s borrowing of English phrases (93) to the phenomenon of “Englishisms” (96) and more, keeping Hong from being a central authority on Asian Americans and exploring interesting threads of thought that might’ve been too short to include in a traditional essay structure.

Bad English was once a source of shame for Hong, but now it’s part of her literary and cultural heritage. Hong not only positions herself in the essay as a child who struggled and felt ashamed about her English but also an adult who writes to expand notions of what English can look like. She writes, “I share a literary lineage with writers who make the mastering of English their rallying cry—who queer it, twerk it, hack it, Calibanize it, *other* it by hijacking English and warping it to a fugitive tongue” (Hong 97). Shame pushes writers inward but it also allows those feelings and ideas to develop further through writing and reading. However, Hong’s shame is not only cultural but political. Hong’s focus on bad English is part of her desire to find “a form—a way of speech—that decentered whiteness” and prioritized multiple threads of

thought and voices other than her own (Hong 104). Paraphrasing the artist Gregg Bordowitz, Hong explains that this desire allowed her to bypass “social media algorithms and consumer demographics by bringing together groups who wouldn’t normally be in the same room together” which would give her ideas more room to expand (Hong 104). This allows her to pursue different angles rather than appealing the dominant culture’s tendency by reducing complicated thoughts to simpler consumer-friendly ideas.

At the end of her essay, Hong does not attempt to make any conclusions about race or shame and allows the reader to join her in a full paragraph of questions that begins by asking how she could even write honestly enough about how she has been hurt and how she has hurt others when envisioning a multicultural future. Her final question is one that stems from seeking to avoid coming from a place of shame or guilt, an apology “without demanding” any forgiveness (Hong 109). By asking her final question “Where do I begin?” Hong admits that she does not know where to begin but wants to understand how (Hong 109). It’s a question for readers that would hopefully spur further discussion and thinking about how to begin conversations about race in America that can move beyond guilt and shame.

By utilizing a couple of paragraphs of rhetorical questions in “The Audacity to Live,” I hoped for the reader to consider and ponder their own identity framed within larger social and historical contexts (Adame 48). I want to push the reader into a moment of self-reflection before they can look more closely at the larger societal issues surrounding a daughter of immigrants who is pursuing higher education in an institution that demands so much of their mental and emotional energy. In order to frame some of these issues in these daughters’ own words, I included pieces of dialogue

from conversations with my cousins as well as friends who share similar situations about hiding parts of themselves in college from their traditional immigrant parents (Adame 5-6; 9-10). I wanted to acknowledge that I am only one voice in a sea of first-generation students struggling to keep up while feeling like expectations are keeping them from fully expressing themselves.

Like Hong, my essay collection also seeks to have a discussion about my ethnic identity in the United States. Part of that is tied to a particular awakening to our own vulnerabilities and strengths in the face of this complex situation of existing as a person of color in America that becomes tied to larger histories as well as social and cultural structures associated with class, gender, and race. The only way we seem to think or theorize about the future is by asking questions and recognizing difficult truths in order to encourage further discourse because we are only one perspective rather than the spokespeople for our respective identities. Anything less would reduce our stories and our cultures to an impossible and stationary monolith that would only serve to center the dominant culture's narrative rather than our own.

Craft Influences

I've learned that reading about writing is a vital practice for developing a sense of the craft in order to enhance my understanding of my own work. Writers Brenda Miller and Suzanne Paola as well as Phillip Lopate served as ideal models for learning and thinking about the craft of creative nonfiction.

Tell It Slant

Reading discussions on craft from writers like Brenda Miller and Suzanne Paola in their book *Tell It Slant: Writing and Shaping Creative Nonfiction* helped me shape my understanding of the craft of creative

non-fiction. They discuss how photography and creative writing hold similarities in the ways the personal "eye" (or I) is the "mechanism for observation, and the inner 'I' is the medium" through which our observations are filtered (Miller & Paola 106). I believe this calls to attention the importance of a strong "I" or first-person perspective in personal essays.

In a personal essay, one can get lost in the various strands of thought and associations that a writer can connect their personal experiences to. Miller and Paola call this "a technical dilemma: How do you effectively frame this experience? What gets left outside the confines of this frame? Are some frames more 'truthful' than others?" They ultimately decide that "the way you decide to frame the world directly reflects the 'I' and the 'eye' that perform this act of construction," which signals to me that it is up to the writer to determine the framing of their essay in order to reflect the voice and concerns of the narrator, whoever that constructed voice in the essay happens to be (Miller & Paola 106). Like a photograph, a personal essay can only fit so much into its frame, so those strands of thought must find their proper place to create a highly manipulated view of reality.

Another key idea presented by Miller and Paola early in their first chapter, "The Body of Memory," that captured my attention was the concept of "imagistic endurance" coined by poet Jenny Johnson (Miller & Paola 5). Johnson described imagistic endurance as "the act of sustaining our attention on images" like the way athletes must build up their stamina through conditioning (Miller & Paola 5). Writers can develop this skill by focusing on a specific memory and keeping an inquisitive eye on the key details for as long as possible to allow the scene to "unfold more deeply" (Miller & Paola 5).

I use my first-person point of view and imbue scenes with the same gravity I experienced them by utilizing sensory details to draw a reader's eye closer, but there is a particular exception for the second-person point of view utilized in "Letter to My Teenage Self," where the details intensify the moment when the psychic's smoke machine "makes you want to gag. Her neon blue lighting will illuminate the slim white slips of paper you and your cousin place on the table. She'll wave her hand over your cousin's paper and pause for a few moments, swirling her fingers covered in shiny silver rings" (Adame 53). I want the reader to feel like their future is in the balance here just like it felt for Alondra at the time. This is the turning point that should slow a reader's breath down as they await the psychic's answer.

Show and Tell

I would like my work to always be as accessible as possible while still providing avenues for people to research and look further. The old rule of "show, don't tell" was something that rang in my ears whenever I was writing my personal essays and deciding what scenes to include from my personal experiences, but Phillip Lopate's *To Show and To Tell* reassured me that I was well within my right to "tell." "I would argue that literary nonfiction is surely the one arena in which it is permissible to 'tell,'" Lopate writes. "In personal essays and memoirs, we must rely on the subjective voice of the first-person narrator to guide us, and if that voice never explains, summarizes, interprets, or provides a larger sociological or historical context for the material, we are in big trouble" (*To Show* 29). I believe personal essays provide an ideal framework for making meaning out of my personal experiences through analysis and reflection since I am just as invested in the *why* of a situation as a reader might be. In most of the essays in the collection, there

is a line of history attached to my identities and experiences which sometimes interact or overlap. I don't want a reader to understand the situation as it was but how and why it impacted my perception of myself or society. Part of this reflection is in order to create meaning and also as a way to educate a reader about multi-faceted social issues or perspectives they might not have encountered before.

I never expect anyone to read my work with a full understanding of the situation. Sometimes I prefer to show what's happening, like in the opening of "I'm (Not) Sorry for Yelling" where I focus on the image of the young white man balancing his disgusting shoes on the shared desk without any regard for the women seated around him. There is a good amount of discomfort and tension in the opening scene where a woman is visibly making herself smaller due to a man's inconsideration which functions as a quiet display of gender dynamics through their movements (Adame 79). Similarly, in "My Brothers' Sister," I choose to open with an explanation of why I threatened to behead a girl "in my younger brother's honor," the beginning of many instances of where I felt responsible for protecting my brother from other people and on a larger scale, one of my first experiences with ableism and the ignorance that accompanies it (Adame *Palabritas* 68).

In my personal essay, "The Audacity to Live," the subjective voice of the first-person narrator successfully provides a larger historical and sociological context for the material through reflection and retrospection on the sociocultural layers that intersect in the essay. There is intersectionality in the issues present in "The Audacity to Live" that center around not only the familial pressures faced by first-generation daughters of immigrants but the sexism and homophobia in Latinx families as well as the classism and elitism that permeates academia. The section which

might be most relevant to “The Audacity to Live” is when Lopate begins examining the way emerging writers are drawn to recite stories of abuse in its multiple forms, arguably similar to my essay’s main concerns (Lopate *To Show* 35). He notes that these novice writers (like me) often think they must speak with “the authority of the victimized outsider” but believes these stories tend to lack “a satisfyingly self-aware narrator” (Lopate *To Show* 35-36). However, the essay acknowledges the privileges of the position the character of Alondra is centered within. For example, the second and third paragraphs of the essay begin with a confrontational tone which slowly unravels into a reflective series of rhetorical questions (Adame 1). The switch to “we” in the final question of the third paragraph “We all have our reasons now, don’t we?” holds the reader and the narrator accountable from the very beginning and narrowly avoids Lopate’s unwanted “self-righteous protagonist” (Adame 1; Lopate *To Show* 36). While revising the essay, I considered removing this particular section of the piece. It felt too aware of itself, but it represented the strings of thinking which I hold myself and others accountable to. However, unlike the example of the student creating an unreliable narrator of himself that Lopate uses as an example, the narrator portrayed in “The Audacity to Live” is hyper-aware of the various strands of thought supported by the critical voice in the piece which aims to gain the trust of the reader.

My own experiences as a queer woman of color are brought to the forefront because of the cultural milestone that I reflected on in “The Audacity to Live.” The context does not disappear amongst the feelings of guilt and resentment in the essay which gives truth to Lopate’s statement that students’ resistance to “relinquish their rage” but the emotion becomes focused as the essay progresses

through the narrator’s journey to claim their independence (Lopate *To Show* 36). The narrator is able to recognize the guilt felt by first-generation women of color while also being aware of the privileged opportunities higher education provides her like jobs with “air conditioning and a decent wage” or spending money at expensive restaurants (Adame 4). These struggles, as the essay concludes, are ongoing, which supports Lopate’s claim about how the “victim narrative” will continue to surface in creative nonfiction courses after taking on a significant place in our cultural grand narrative (Lopate *To Show* 36). The American cultural and political climate does center and exploit the experiences of victims in multiple ways, experiences that have occurred over and over again throughout the country’s history. Victimization is a cyclical process, one which the first-person narrator of “The Audacity to Live” continues to fight against at the end of the essay. It is the most honest conclusion to come to but only after following the first-person narrator through what Lopate calls “a live, candid mind thinking on the page, exploring uncharted waters” in order to portray a reliable and complex narrator (Lopate *To Show* 43).

I would argue that ambivalence is a requirement of survival for a character such as the first-person narrator of Alondra in “The Audacity to Live.” This ambivalence is present at the very beginning of the essay when the narrator discusses the way “daughters of immigrants born in the United States, particularly women of color” are required to suffer emotionally and mentally while succeeding academically and beginning to recognize the privileges accumulated through this act of selfishness and sacrifice (Adame 1). Many of the experiences in “The Audacity to Live” are ones where the protagonist has been the victim, but the essay provides a complex first-person narrator who is aware of the over-

lapping layers of privilege and oppression through critical reflection and retrospection in order to give the reader a larger historical and sociological context.

Looking Forward

After publishing “The Audacity to Live” in *The Nasiona* and “My Brothers’ Sister” in *PALABRITAS*, I’ve given further thought to how I’d like to present myself as a writer in the future. I don’t think I’d like to be seen solely as a queer Chicax writer although, obviously, my identities inform my writing and ways of thinking. I hold strong positions in my writing through these lenses, but I want readers to recognize that my writing aims to reveal something about the interconnectedness of the world through my personal experiences. This interconnectedness is something that I don’t want to be mistaken for “universality,” a term that I feel is over utilized in conversations about personal essays and suggests that we all fall under some cosmic umbrella where we are all inevitably the same inside. I might even argue that universality is inadequate to function this way in regard to creative nonfiction. I see these experiences as threads of a larger web, always growing in size or connecting to other ideas and concepts that are seemingly unrelated until they’re rendered in someone’s personal experiences and ways of thinking to tie them all together. This is how colonization can be related to a party, how a man’s dirty shoes represent the patriarchy, and how an argument on the playground can lead into a larger conversation about ableism in *The Audacity to Live*.

I don’t quite believe in the universality that writers such as Lopate might aim for, a universality that might only exist for privileged cis straight white people who have found themselves the default for their experiences. Last fall, I came across poet and writer Chen Chen’s craft essay “Craft Capsule:

Against Universality, in Praise of Anger” where he writes “If the particular is a doorway to the universal, who maintains the door? Who made it? Do I want to travel to that universe anyway? If the particulars must be understandable, palatable to a white audience, is that a universe or is that the white gaze?” (Chen). I believe more in the interconnectedness of human emotion since shared experiences are only a small facet of what my writing attempts to demonstrate. Not everyone can share my experiences, but they can share my emotions or my reactions to certain events and look to understand the experience as part of a smaller whole. I think part of that is bringing readers into my universe while simultaneously recognizing that I’m inviting in strangers and friends alike. I do have an interest in the white gaze, but only as the backboard where criticisms can be made about the issues or topics it doesn’t wish to acknowledge. I think pointing out the avoidance of a conversation is usually a good way to get a conversation going within a personal essay. While I have no intention of making my writing more palatable to a white audience, I have a good understanding of what might be necessary for a reader to understand in an essay and what they might actually be able to look up on their own.

Taking Sarah Pape’s class *Editing Literary Magazines* taught me that I should be more selective about where I should publish my work, not in terms of the capitalist lens that often shapes publication and genre restraints, but in terms of who I want to be “related to” in a literary sense. So far, I’ve been interested in smaller indie magazines and journals because I relate to people in those spaces. I love that I’ve found queer, Chicax, and Latinx poets and writers who understand what it’s like to be a writer and a student, a writer and a teacher, and a writer who works with what little time we have. I look up to the writers I inter-

act with like Lupe Mendez, Alan Charazo, Kim Sousa, and Venus Davis who have given me advice and opportunities to interact in the lit community online when I cannot travel or attend events like AWP. Even the writers I've decided to teach my own students this semester are predominantly queer writers or BIPOC writers, like Sandra Cisneros, Ryan Van Meter, Ross Gay, Ada Limón, Chen Chen, Terrence Hayes, and Juan Alvarado Valdivia, who have had an impact on how I view my writing process through discussions with my students.

In terms of presses, I am interested in FlowerSong Press for the future. You could say that they are my dream press since their editor-in-chief is Edward Vidaurre and their founder is David Bowles, both Latinx writers I admire. They will be publishing other Chicanx and Latinx writers I look up to such as Juan Felipe Herrera, Carmen Tafolla, and Ariel Francisco. It'd be fantastic to publish a manuscript that is even a little bit connected to such amazing writers.

Beyond publishing, I'd like to continue teaching creative writing and find other opportunities to support writers. For now, I am happy with writing my own work and helping others find their writing voice. This collection of essays represents part of my growing awareness and journey as a writer as well as a call to action for readers: May you have the audacity to live your life for yourself and hold that courage within you, always.

Works Cited

- Adame, Alondra. "My Brothers' Sister." *PALABRITAS*, 26 Oct. 2021, pp. 68-79.
- Adame, Alondra. "The Audacity to Live." *The Nasiona*, 1 Feb. 2020, <https://www.thenasiona.com/2020/02/01/the-audacity-to-live/>.
- Chen, Chen. "Craft Capsule: Against Universality, in Praise of Anger." *Poets & Writers*, 16 Nov. 2020, www.pw.org/content/craft_capsule_against_universality_in_praise_of_anger.
- Crucet, Jennine Capó. *My Time Among the Whites: Notes from an Unfinished Education*. Picador, 2019.
- Hong, Cathy Park. *Minor Feelings: An Asian American Reckoning*. One World, 2020.
- Lopate, Phillip. *The Art of the Personal Essay: An Anthology from the Classical Era to the Present*. Anchor Books, 1994.
- Lopate, Phillip. *To Show and To Tell: The Craft of Literary Nonfiction*. Free Press, 2014.
- Miller, Brenda, and Suzanne Paola. *Tell It Slant: Writing and Shaping Creative Nonfiction*. 3rd ed., McGraw Hill, 2019.

This is a paper written by a history graduate student. Their faculty mentor was Professor Michael Magliari. Though formatted slightly differently for this journal, the style guide used for this paper was Kate L. Turabian's *Manual for Writers of Term Papers, Theses, and Dissertations*, which is typical of papers in this discipline and utilizes footnotes.

“This Happened in a Matter of a Single Generation”: New York to Chico, the Life of Civil War Veteran Charles H. Lindsley, 1841-1932

Juan E. Vega Ramirez

Introduction

Although historians continuously dispute the boundaries of time periods and historical eras, most can agree that the turn of the twentieth century marked a stark departure from not only the previous hundred years of human history but all of human history. Eric Hobsbawm contends that the four decades between 1875 and 1914 were “the most revolutionary ever experienced by the human race.”¹ In the United States, this observation can easily be extended to include the prosperous yet turbulent decades of the Jacksonian and Antebellum Eras (c. 1828-1850) where the contours of modern government, federal institutions, and electioneering campaigns began to form.² Furthermore, the questions posed during the secession crisis and the subsequent American Civil War and Reconstruction also proved revolutionary. As Stephanie McCurry and countless other Civil War historians have pointed out, the war against the seceding Southern states ushered in dramatic transformations in all aspects of American life including but not limited to gender roles, the rise of American nationalism, and the increasing power of the federal government.³ To be sure, the entire world

transformed during the nineteenth century. For the first time since the emergence of non-nomadic cultures, “the world population was ceasing to consist of people who lived by agriculture and livestock.”⁴ In the wake of this paradigm shift, countries of the world became urban, industrialized, and globally connected. More surprisingly still, “this happened in a matter of a single generation.”⁵

Among the plethora of Americans who experienced such transformations within their lifetime stands Charles Hammond Lindsley who continuously found himself moving west from his birthplace in New York, chasing economic opportunities in agricultural production, and ultimately spending his final years in a burgeoning modern city in California. Along the way, he directly and indirectly engaged with the emerging modern society: he volunteered for service in the Union army, contributed to the economy as a producer of raw goods, purchased bonds, and established a family who benefitted from his willingness to ensure their success. Furthermore, Lindsley appears to have done well for himself throughout his life. He managed to acquire property everywhere he lived and eventual-

(Lawrence, Kan: University Press of Kansas, 2002); Susan-Mary Grant, *North over South: Northern Nationalism and American Identity in the Antebellum Era* (Lawrence: Univ Press of Kansas, 2000); Susan Mary Grant and Peter J. Parish, eds., *Legacy of Disunion: The Enduring Significance of the American Civil War*, First edition (Baton Rouge: LSU Press, 2003); Richard Beeman, *Beyond Confederation: Origins of the Constitution and American National Identity*, ed. Edward C. Carter II and Stephen Botein (Chapel Hill: Omohundro Institute and University of North Carolina Press, 1987).

4 Hobsbawm, *The Age of Empire*, 335.

5 Ibid.

1 Eric Hobsbawm, *The Age of Empire: 1875-1914*, Reprint edition (New York: Vintage, 1989), 335.

2 Harry L. Watson makes this case throughout his seminal work *Liberty and Power: The Politics of Jacksonian America*, 2nd edition (New York: Hill and Wang, 2006), however the “big picture” is especially apparent in the “Introduction” and concluding chapter, “The Second American Party System.”

3 Stephanie McCurry's *Confederate Reckoning: Power and Politics in the Civil War South*, Reprint edition (Cambridge, Mass.: Harvard University Press, 2012); Melinda Lawson, *Patriot Fires: Forging a New American Nationalism in the Civil War North*

ly settled in Chico, California as a “retired capitalist.”⁶ Charles Lindsley was one of the millions in his generation who refused to sit idle while the world transitioned to modernity, opting instead to seize opportunities as they materialized in the hope of facilitating advancement and prosperity in the process.

William and Lydia Lindsley gave birth to their second son, Charles, in Madison County, New York in 1841. Although descriptions of the child do not exist, the recruiting officer who inspected twenty-three-year-old Charles after he volunteered for the army described him as having black hair, grey eyes, and a dark complexion.⁷ Young Charles moved with his parents and two older siblings, Harriet and Lucien, to Wisconsin about three years after his birth.⁸ In 1850, the Lindsley family resided in Brookfield where they maintained a farm. It was a good decade to live in the area; beginning in 1847, the Milwaukee and Waukesha Railroad Company (later renamed the Milwaukee and Mississippi Railroad in 1850) busied themselves with linking Milwaukee's railroad network south to Mississippi. In doing so, they ran railroad tracks through the town of Brookfield and built a depot at its junction. This allowed the region to prosper as farmers gained invaluable access to speedy transit which aided commerce and the expansion of the township.⁹

6 *Oroville Daily Register*, July 2, 1913.

7 United States, Census Bureau, Year 1850, Census Place: Brookfield, Waukesha, Wisconsin, Roll: M432_1009; page: 433A; United States. Department of War. Enlistment Papers. Year 1865, Enlistment Place: Winnebago, Faribault, Minnesota, National Archives, provides a description of Charles at age 23.

8 United States, Census Bureau, Year 1850, Census Place: Brookfield, Waukesha, Wisconsin, Although the document does not include the date of arrival, we can reasonably conclude that the family moved to Brookfield about three years after 1841 because all of Charles' siblings were recorded as being born in New York except for Nancy Jane (age five), Mary (age three), and Lydia A (age 6/12) who were all born in Wisconsin.

9 “About Brookfield | Brookfield, WI - Official Web-

By 1860, the Lindsley family moved approximately forty-five miles northwest to the Beaver Dam township of Dodge County, Wisconsin. At nineteen years old, Charles undoubtedly helped his father and mother with household chores and maintaining the family farm.¹⁰ While precise documentation for the work he performed is unavailable, the isolation of farms in rural Wisconsin necessitated self-sufficiency and required the productive capabilities of all family members.¹¹ In 1860, Dodge County boasted 235,642 acres of improved farmland. Farmers in the area produced 1,460,744 bushels of wheat, 856,221 pounds of butter, 49,391 pounds of cheese, and raised \$1,069,933 worth of livestock. They also cultivated other staple crops such as barley, rye, Indian corn, and Irish potatoes.¹²

The Lindsley family appears to have enjoyed a decent standard of living. For example, whether planned or not, William and Lydia Lindsley managed to give birth to eight healthy children within the span of twenty-two years; only one child, Martha, did not live past fifteen.¹³ Although William only reported \$100 in the “value of personal estate” section of the 1860 census, he valued his property at \$4,000. In comparison, of the five properties listed after William's farm,

site,” accessed October 3, 2019, <http://www.ci.brookfield.wi.us/59/About-Brookfield>.

10 United States. Census Bureau. Year 1860, Census Place: Beaver Dam, Dodge, Wisconsin, Roll: M653_1405; Page: 46, Charles and his siblings have “Domestic” listed under the Occupation category.

11 Percy W. Bidwell, *History of Agriculture in the Northern United States, 1620-1860* (Baltimore, Maryland: The Lord Baltimore Press, 1925), 249.

12 United States Department of the Interior, Census Bureau, *Agriculture of the United States in 1860; Compiled from the Original Returns of the Eighth Census* (Washington, D.C.: Government Printing Office, 1864), 166-68.

13 “Charles H Lindsley - Facts,” accessed September 19, 2019, <https://www.ancestry.com/family-tree/person/tree/7790064/person/280106320307/facts>, contains a list of important events in Charles' life, his sister Martha was born in 1855 and died in 1870.

the census enumerator jotted \$1,600 for the value of two and \$1000 for the other three. Moreover, despite the tremendous amount of work that the Lindsley children potentially contributed to their family's farm, they all, with the exception of the youngest girl, attended school within the year of the census count.¹⁴ William was undoubtedly fortunate to have two adult sons living at home to help cultivate crops, raise livestock, and bring the product to market. In the 1860s, competition in commercial agriculture was already becoming fierce.¹⁵ The Lindsleys, like other farming families in the region, had to participate in this emerging market economy as well.

The natural fertility of Wisconsin soils, dependable wheat prices, and increasing access to interstate markets, especially those on the East coast, "made men a bit crazy" for wheat.¹⁶ The focus on wheat production caused some contemporaries to describe Wisconsin wheat farmers as "wheat miners" rather than responsible agriculturalists. Although profitable, wheat mining, or the intensive cultivation of wheat, robbed the soil of its fertility in a few short years.¹⁷ The decline of fertile soil coupled with harsh winters and outbreaks of *Blissus leucopterus* (chinch bugs) proved detrimental to farmers in Wisconsin; the bugs and the cold destroyed wheat crops while the soil continued to decline in productivity.¹⁸ A

14 United States, Census Bureau, Year 1860, Census Place: Beaver Dam, Dodge, Wisconsin, Charles, his older brother Lucien (21 years old), sisters Jane (14), Mary (12), Lydia (10), Adelaide (7), and Martha (5) attended school. Adella (1) probably did not go to school because she was too young.

15 Bidwell, *History of Agriculture in the Northern United States*, 308.

16 Edward Janus, *Creating Dairyland: How Caring for Cows Saved Our Soil, Created Our Landscape, Brought Prosperity to Our State, and Still Shapes Our Way of Life in Wisconsin* (Madison, Wisconsin: Wisconsin Historical Society Press, 2011), 6.

17 Ibid.

18 Bidwell, *History of Agriculture in the Northern United States*, 330-32.

viable wheat market nevertheless allowed farmers and land speculators to flip farms for a quick profit which consequently drove up the price of land in the state.¹⁹

Luckily, Wisconsin families created other sources of income from which to make ends meet if and when wheat failed. As mentioned above, they grew a variety of staple crops and maintained a considerable amount of livestock. Moreover, as Paul Reckner demonstrates through archeological excavations in nearby Racine County, some families in Wisconsin earned cash or payment in goods by housing travelers and their team of oxen and by running informal taverns in their homes.²⁰ Furthermore, while some participated in land speculation and farm flipping, farmers with an ear to the changing trends of the region slowly transitioned to dairy farming, consequently creating "America's Dairyland" in the process.²¹ Those that could not stay competitive, maintain well-fed dairy stock, or afford the high price of land opted to continue moving west to newly admitted states.²²

Minnesota was one such state that drew emigrants from the east and immigrants from abroad. It became an organized territory in 1849 and gained statehood in 1858, thanks in large part to the growing number of Europeans that moved there.²³ Undeniably, the availability of land attracted many newcomers, much to the chagrin of the local Dakota people that only a few years prior called the region home.²⁴ Like many people before him,

19 Janus, *Creating Dairyland*, 7.

20 Paul E. Reckner, "Investigating Farmstead Life in Nineteenth-Century Racine County," *Wisconsin Magazine of History* 93, no. 2 (Winter, 2009), 43-44.

21 Norman K. Risjord, "From the Plow to the Cow," *Wisconsin Magazine of History*, (Spring 2005), 42.

22 Bidwell, *History of Agriculture in the Northern United States*, 1620-1860, 448.

23 Rhoda R. Gilman, "The History and Peopling of Minnesota: Its Culture," *Daedalus* 129, no. 3 (2000), 4.

24 Annette Atkins, "Facing Minnesota," *Daedalus*,

Charles H. Lindsley moved to Minnesota and established a farm of his own. He appears in the Minnesota census schedules as early as 1870. The exact date on which he migrated west is unknown. However, his Union Army enlistment papers indicate that he was already living in the state in January 1865.²⁵ Census schedules for 1870 and 1890 reveal that he married Juliette Gove in 1864.²⁶ Since he was newly married, Charles probably wanted to acquire land and build a home for his fledgling family. He may have decided to migrate to Minnesota over someplace in Wisconsin because it was more pragmatic to do so; land in Wisconsin was more expensive than in Minnesota even though the soil could produce the same variety of crops and was just as fertile. Although a lack of evidence makes it impossible to know exactly when or why he moved, the documents that provide information on his whereabouts pose a significant question regarding the Civil War; why did Charles volunteer for service so late in the war?

One possible answer to this question is that he stayed home to continue contributing labor to his father's farm. After he married Juliette, the high cost of land in Wisconsin forced him to look outside the state for cheaper property on which to root his budding family. Alterna-

2000, 34-36.

25 United States, Census Bureau, Year 1870, Census Place: Shelby, Blue Earth, Minnesota, Roll: T132_1; Page: 680; United States, Department of War, Enlistment Papers, January 28, 1865, Enlistment Place: Shelby, Blue Earth, Minnesota, National Archives.

26 United States, Census Bureau, Year 1900, Census Place: Morris, Stevens, Minnesota, Page: 7; Enumeration District: 0265; FHL microfilm: 1240793, indicates that Charles and Juliette were married for 36 years; United States, Census Bureau, Year 1870, Census Place: Shelby, Blue Earth, Minnesota, Roll: T132_1; Page: 680, is the first time Juliette is listed alongside Charles; United States, Department of War, Enlistment Papers, Year 1865, Enlistment Place: Shelby, Blue Earth, Minnesota, National Archives, demonstrates that Charles was already living in Shelby as early as January 28, 1865.

tively, he could have migrated to Minnesota shortly before the war erupted, or even sometime during the conflict, married Juliette, and spent his time establishing his farm. The latter scenario is interesting considering Minnesota's role in the war. The American Civil War officially began on April 15, 1861 as President Lincoln called for "75,000 volunteer soldiers to serve in conjunction with 10,000 regulars. . . for three months 'unless sooner discharged.'" ²⁷ Minnesota answered the call immediately; through the actions of its Governor, Alexander Ramsey, it became the first state to volunteer citizens for the Union Army. Minnesotans, "from every occupied portion of the state," responded enthusiastically to the call and enlisted in droves.²⁸ Even if Charles was not in Minnesota in 1861, enthusiasm to enlist and "put down the rebellion on glorious fields of battle" existed in Wisconsin and throughout the Northwest.²⁹ The "Spirit of '61" described the rapturous feeling of patriotism that volunteers exuded as they enlisted for the required ninety days.³⁰

Despite the enthusiasm, Charles Lindsley did not volunteer for service until January 28, 1865, just four months before the last battle of the war was fought at Palmito Ranch near Brownsville, Texas, and only seventy-eight days before Confederate General Robert E. Lee surrendered after the Battle of Appomattox Court House.³¹ Regardless of when he moved to Minnesota, his decision to enlist may have been motivated by a need for income. Lindsley's muster rolls and enlistment contract indicate that the state paid him

27 R. I. Holcombe et al., *History of the First Regiment Minnesota Volunteer Infantry, 1861-1864* (Stillwater, Minnesota: Easton & Masterman Printers, 1916), 1.

28 Ibid., 3-5.

29 John Zimm, "This Wicked Rebellion: Wisconsin Civil War Soldiers Write Home," *The Wisconsin Magazine of History* 96, no. 2 (2012), 25.

30 Bruce Catton, *The Civil War*, Reprint edition (Boston: Mariner Books, 2004), 25.

31 Ibid., 304.

a bounty of \$33.33, with \$66.67 due to him at a later date, for one year of service.³² Since he lived in Shelby and declared himself a farmer at the time of enlisting, it is likely that he already established a farm or was in the process of making it operational. The bounty he collected upon volunteering could serve to pay for whatever expenses he and Juliette potentially had.

Moreover, his decision could have also been influenced by the fact that the end of the war appeared imminent at the end of 1864.³³ In Mankato, the county seat of Blue Earth, the local newspaper reported on several Union victories against Confederate forces in December 1864.³⁴ *The St. Paul Press* in nearby Ramsey County similarly noted that the Union army was “confident of final success” as Confederate troops sought “safety in flight.”³⁵ By December 29, the daily supplier of news in St. Paul announced that Union “armies [were] pressing forward with ceaseless and remorseless activity” and that “everywhere victory crowns [their] arms.”³⁶ It continued reporting good news for the Union throughout January. On the twentieth, a week before Charles enlisted, *The St. Paul Press* printed a synopsis of the battle for Fort Fisher where the Union scored a major victory after it established a blockade on the Cape Fear River and effectively blocked “the only channel the rebels had left for the importation of munitions of war.”³⁷ On the same day, it reported that two peace envoys from Alabama were rumored to have visited Presi-

32 United States, Department of War, Enlistment Papers, Year 1865, Enlistment Place: Shelby, Blue Earth, Minnesota, (National Archives), January 28, 1865; United States, Department of War, Company Muster and Descriptive Roll, 1st Minnesota Heavy Artillery Battery F (National Archives), February 11, 1865.

33 Catton, *The Civil War*, 244-45.

34 *The Mankato Union*, December 2, 1864; December 16, 1864; December 30, 1864.

35 *St. Paul Press*, December 23, 1864.

36 *Ibid.*, December 29, 1864.

37 *Ibid.*, January 20, 1865.

dent Lincoln and that he “was giving his mind to. . . bring about a [peace] settlement.”³⁸

Charles, understanding that the end of the war was nigh, may have decided to volunteer for service to receive the enlistment bounty. If so, this episode demonstrates that Charles was pragmatic and opportunistic, traits that he maintained throughout his life. This is also evident considering that although Civil War soldiers often left the burden of farm work to their wives, Juliette potentially had support during the months that Charles was away. The 1870 census schedules demonstrate that Lucien, Charles’ older brother, lived on the property neighboring his land.³⁹ His family from Wisconsin had also moved nearby.⁴⁰ The proximity of Charles’ family suggests that they helped each other much like they did in Wisconsin. At that distance, Lucien and his wife, Seraph, could help Juliette with the farm or potentially provide food and other necessities if needed. Again, this shows pragmatism and a willingness to seize opportunities as they became available, attributes that Charles unknowingly shared with Americans experiencing the effects of modernization.

To be sure, the contours of modern life were already beginning to manifest in the lives of people living in the 1860s. Indeed, more people throughout the world attended school regularly which facilitated the growth of science and innovation.⁴¹ Individuals every-

38 *Ibid.*

39 United States, Department of the Interior, Census Bureau, Year 1870, Census Place: Shelby, Blue Earth, Minnesota, Roll: T132_1; Page: 680; “Fold3 Search ‘Lucien Lindsley,’” Fold3, accessed October 10, 2019, <https://www.fold3.com/search-results?keywords=Lucien+Lindsley>, Lucien does not appear to have enlisted for service during the Civil War.

40 United States, Census Bureau, Year 1870, Census Place: Sterling, Blue Earth, Minnesota, Roll: T132_1; Page: 714, although the exact date is not available, William, Lydia, and Charles’ younger siblings moved to the area by 1870.

41 United States, Census Bureau, Year 1860, Census Place: Beaver Dam, Dodge, Wisconsin, Roll: M653_1405; Page: 46. Information regarding Charles

where created technologies that served to bring the world physically and perceptually closer. The shape of U.S. territory also began to form as the United States gained a large part of northern Mexico in 1848, bought Alaska from Russia in 1867, and welcomed several new states into the Union from 1850 to 1861.⁴²

However, the inclusion of new states also reignited the debate over the expansion of slavery which consequently gave way to secession and the Civil War.⁴³ By the time Charles Lindsley volunteered for service on January 28, 1865, the largest and most bloody battles of both the Eastern and Western theater had already been fought. Ironically, however, the American Civil War began with a bloodless battle over the control of Fort Sumter, a brick stronghold located on an island near the mouth of Charleston Harbor.⁴⁴ Notwithstanding the clean start, the war did not remain bloodless for long. The first major battle took place on July 21, 1861 at a “high banked little stream that few men in either army had ever heard of, known locally as Bull Run.”⁴⁵ The First Battle of Bull Run shattered all hopes and illusions both sides maintained regarding a quick end to the war and set the stage for the rest of the conflict. It demonstrated “that battles of this war would be bigger, more destructive, and more deadly than anything Americans had ever experienced.”⁴⁶ It also forced both sides of the conflict to hurriedly build war machines and transition their

Lindsley’s education is sparse. However, the 1860 census indicates that Charles was still attending school at nineteen years old.

42 *Ibid.*, 136, the new states added include California (1850), Minnesota (1858), Oregon (1859), Nevada (1864), and Kansas (1861).

43 Catton, *The Civil War*, 10-18.

44 *Ibid.*, 24.

45 L. Van L. Naisawald, “Bull Run: The Artillery and the Infantry,” *Civil War History* 3, no. 2 (1957), 163-64.

46 “Historians’ Forum: The First Battle of Bull Run,” *Civil War History* 57, no. 2 (July 3, 2011), 113.

respective societies to sustain the war effort.⁴⁷ The death toll climbed steadily after the First Bull Run. During the Battle of Gettysburg, for example, over 50,000 Yankee and Rebel soldiers were wounded, missing, or killed; the highest casualty count from any individual battle of the war.⁴⁸ Moreover, although conservative estimates suggest that the war claimed 620,000 total casualties, J. David Hacker believes the total to be closer to 750,000.⁴⁹

Taking the number of casualties into consideration, Charles’ decision to enlist when he did seems more rational. In January 1865, he traveled less than fifteen miles to Winnebago from his home in Shelby to volunteer for the Union Army. In doing so, he agreed “to serve as a soldier in the Army of the United States of America” and swore to “obey the orders of the President of the United States, and the orders of the officers appointed over [him].”⁵⁰ From Winnebago, he reported to St. Paul, Minnesota for inspection. The examining surgeon declared him “free from all bodily defects and mental infirmity” and the recruiting officer accepted him “as duly qualified to perform the duties of an able-bodied soldier.”⁵¹ He was assigned to Battery F of the First Minnesota Heavy Artillery Regiment and mustered into service on February 11,

47 *Ibid.*, 115.

48 “Civil War Casualties,” American Battlefield Trust, November 16, 2012, <https://www.battlefields.org/learn/articles/civil-war-casualties>; Catton, *The Civil War*, 157.

49 J. David Hacker, Civil War Death Toll May Be Really Off, interview by Robert Siegel, Public Radio via NPR, May 29, 2012, <https://www.npr.org/2012/05/29/153937334/professor-civil-war-death-toll-may-be-really-off>; J. David Hacker, “Has the Demographic Impact of Civil War Deaths Been Exaggerated?,” *Civil War History* 60, no. 4 (2014): 453-58; “Civil War Death Toll Rises Dramatically,” *American History* 47, no. 3 (August 2012), 12.

50 United States, Department of War, Enlistment Papers, Year 1865, Enlistment Place: Winnebago, Faribault, Minnesota (National Archives).

51 *Ibid.*

1865.⁵² On March 1, Major General George Henry Thomas dispatched Charles and the rest of Battery F to Chattanooga, Tennessee “for duty with the garrison thereof.”⁵³ Before doing so however, Charles and the rest of the volunteers had to transform from civilians to soldiers. During the Civil War, training for recruits “started when companies formed into regiments.”⁵⁴ A new soldier’s day typically “began with early morning reveille and breakfast, followed by two to three hours of squad and company drill until noon,” and resumed in the mid-afternoon “on a battalion level until around five.”⁵⁵ Charles and Battery F spent just over three weeks training before traveling to Tennessee to fulfill their assignment.

At Chattanooga, Battery F joined the rest of the First Minnesota Heavy Artillery who were permanently stationed there since November 21, 1864.⁵⁶ The city’s position on the Tennessee River just south of the Cumberland Mountains guaranteed its importance for the Confederacy and the Union. Even before the start of the Civil War, contemporaries described Chattanooga as the “Key to Tennessee” and the “Gateway to the Deep South.”⁵⁷ Union occupation of Chattanooga

52 United States, Department of War, Muster and Descriptive Roll, 1st Minnesota Heavy Artillery Battery F, February 11, 1865.

53 United States, Department of War, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, I, vol. XLIX part I (Washington: Government Printing Office, 1897), 806.

54 Mark A. Weitz, “Drill, Training, and the Combat Performance of the Civil War Soldier: Dispelling the Myth of the Poor Soldier, Great Fighter,” *The Journal of Military History* 62, no. 2 (1998), 272.

55 Ibid., 273.

56 United States, Department of War, *The War of the Rebellion*, I, vol. LII Part II, (Washington: Government Printing Office, 1898), 662.

57 James R. Sullivan, *Chickamauga and Chattanooga Battlefields: Chickamauga and Chattanooga National Military Park, Georgia-Tennessee*, Historical Handbook Series (Washington, D.C: United States National Park Service 1956), 2.

ga began immediately after the Army of Tennessee abandoned the city on September 9, 1863.⁵⁸ Making use of the infrastructure the Confederacy established while it garrisoned the city from 1861 to 1863, Union troops retreated to Chattanooga after suffering a “bloody defeat at Chickamauga.”⁵⁹ They held the city through a twenty-nine-day siege in October and then gained control of surrounding strongholds during the battles of Lookout Mountain and Missionary Ridge in November 1863. While besieged, the starving troops “razed houses and felled virtually all the trees of the town to create an unbroken line of fire.”⁶⁰

After the Battle of Chattanooga, Confederate sympathizers poured out of the city as Union forces prepared to camp for the winter. Conditions in the city became grim during the siege and although the U.S. military worked quickly to repair railroad lines and resupply the population, conditions did not improve until the following year.⁶¹ One citizen complained that “there was no Sunday school. . . no stores open, no markets of any kind” and that “the town was white with tents; soldiers’ tents, sutlers’ [sic] tents” and “tents for. . . ‘Freedmen.’”⁶² Union soldiers built warehouses on the riverfront to store supplies and appropriated vacant lots to enclose livestock. Once supplies trickled in via the railroad or Tennessee’s waterways, they established a national cemetery, helped renowned Unionist James R. Hood reestablish his newspaper, the *Chattanooga Gazette*, held formal dances,

58 Josh Smith, “The Chattanooga Campaign: Death of the Confederacy” (M.A., Minnesota State University, Mankato, 2013), 38-39; Sullivan, *Chickamauga and Chattanooga Battlefields*, 9; Smith, “Death of the Confederacy,” 56.

59 Gilbert E. Govan and James W. Livingood, “Chattanooga Under Military Occupation, 1863-1865,” *Journal of Southern History* 17, no. 1 (February 1951), 24.

60 Ibid.

61 Ibid., 26.

62 Ibid., 24-25.

and tried to maintain friendly relations with civilians.⁶³

Although living conditions continued to improve through 1864, the city remained on high alert as rumors circled that the Confederacy planned a large-scale attack to recapture the city. Union forces had “reason for anxiety” as they anticipated Confederate General John Bell Hood’s movement through Tennessee.⁶⁴ Civilians and the soldiers stationed at Chattanooga feared that Hood would attempt to take the city as he made his way to Nashville where his forces would link with General Robert E. Lee’s Army of Northern Virginia to delay the result of the war. The Confederate threat to the city thus warranted the creation and deployment of a heavy artillery unit.⁶⁵ By the time Charles Lindsley arrived in Chattanooga with the rest of Battery F however, Hood was no longer a threat. From October to December 1864, the Army of Tennessee maneuvered northwest of the city toward Decatur and then north to Nashville where it suffered a crushing loss to “the Rock of Chickamauga,” General Henry Thomas.⁶⁶ Despite the lack of threat from the Confederate armies, garrison duty in Chattanooga was not necessarily a walk in the park. Of the 150 men serving in Battery F, five died while stationed at Chattanooga. Even though the body count here is low, it is nonetheless surprising because Charles and the First Minnesota Heavy Artillery Regiment never saw combat.⁶⁷

Jerry S. Sartin argues that the Civil war was “the last great armed conflict in the world fought without knowledge of the germ theo-

63 Ibid., 27-29,34-35.

64 The Board of Commissioners, *Minnesota in the Civil and Indian Wars 1861-1865* (St. Paul, Minnesota: Pioneer Press Company, 1891), 612-13.

65 Ibid.

66 Catton, *The Civil War*, 234-40.

67 The Board of Commissioners, *Minnesota in the Civil and Indian Wars*, 625-27.

ry of disease.”⁶⁸ As a result, disease caused roughly two-thirds of all deaths during the Civil War. Alfred J. Bollet likewise suggests that the “Federal army recorded approximately 6.5 million diagnosed episodes of illness” throughout the conflict.⁶⁹ Soldiers could come face to face with the “Third Army” of disease through a variety of ailments; bronchitis, smallpox, influenza, pneumonia, and erysipelas spread from person to person in camps; mites, lice, and ticks transmitted typhus and malaria; wounds sustained in battle developed gangrene and other fatal bacteria.⁷⁰ As Sartin explains however, “of all the adversities that Union and Confederate soldiers confronted, none was more deadly or more prevalent than contaminated water.”⁷¹ Fecal transmission of diarrhea, cholera, and typhoid proceeded without restraint since “few physicians or commanders recognized the importance of placing latrines downstream from camp.”⁷² Ultimately, Union forces counted approximately 21,000 deaths out of the 360,000 episodes of diarrhea or dysentery they suffered.⁷³ Like many soldiers before him, Charles fell victim to the assault of the Third Army while performing his duties in Chattanooga.

About two months after his arrival in the city, Charles contracted something that caused him to suffer from chronic diarrhea; the culprit was probably one of the usual suspects, cholera or dysentery. On July 6, Assistant Surgeon Milo M. Mead careful-

68 Jeffrey S. Sartin, “Infectious Diseases during the Civil War: The Triumph of the ‘Third Army,’” *Clinical Infectious Diseases* 16, no. 4 (1993), 580.

69 Alfred Jay Bollet, “The Major Infectious Epidemic Diseases of Civil War Soldiers,” *Infectious Disease Clinics of North America*, Historical Aspects of Infectious Diseases, Part II, 18, no. 2 (June 1, 2004), 293.

70 Sartin, “Infectious Diseases during the Civil War,” 581.

71 Ibid.

72 Ibid.

73 Ibid.

ly examined Charles and declared him unfit for duty since he had already endured two months of the illness by the time Mead evaluated him. “To prevent permanent disability,” Mead recommended that he take a thirty-day furlough to rest and certified “that a change of climate [was] necessary.”⁷⁴ After receiving the Assistant Surgeon’s recommendations, Senior First Lieutenant Alvin M. Collins submitted a formal request to obtain the recommended furlough for Charles on July 14. Exactly one week later, the Medical Director’s Office approved the request.⁷⁵ Charles made it home to Shelby, Minnesota by August 2 where he penned a letter to Lieutenant Colonel William W. Averell respectfully requesting to be discharged.⁷⁶ In doing so, he once again demonstrated his aptitude for seizing opportunities.

While in Chattanooga, Charles witnessed at least five of his comrades in Battery F leave on furlough and then get discharged from service “when absent from company.”⁷⁷ Although the records do not specify the reason for their absence or the reason for their discharge, one can surmise that they too fell victim to the Third Army since Union forces reported that “220,000 men were discharged for reasons of chronic disability.”⁷⁸ In the letter, Charles explained that his furlough extended until the twenty-fifth of August because he had “been sick since the sixth of May” and was wondering if he should report back “at the expiration of that time” or be discharged since he had his “conscriptive

74 United States, Department of War, Military Service Records: Charles H. Lindsley, (National Archives), Note from M. M. Mead, July 6, 1865.

75 Ibid.

76 United States, Military Service Records: Charles H. Lindsley, Letter from Charles H. Lindsley, August 2, 1865.

77 The Board of Commissioners, *Minnesota in the Civil and Indian Wars*, Refer to “Roster of Company F” section, 625-27.

78 Sartin, “Infectious Diseases during the Civil War,” 580.

[sic] list with [him].”⁷⁹ By alluding to his four months of unending suffering, Charles may have implicitly tried to garner some sympathy from his superiors. After all, as Dillon Carrol points out, “everyone got diarrhea during the Civil War.”⁸⁰ Furthermore, perhaps he hoped that his commanding officers would agree to discharge him since he already had the necessary paperwork, the so-called “conscriptive list” or enlistment papers, in his possession.

To be sure, asking for a discharge at this time was a logical move; the last battle of the war was fought on May 13. Although reconstruction was officially underway, heavy artillery regiments could not realistically help keep the peace or diffuse tensions. Receiving a discharge while at home would save Charles the time and effort of traveling to the regional headquarters in Nashville, obtaining a discharge, and then turning around and making the trip back to Shelby. Unfortunately for him, that is exactly what he had to do. Adding insult to injury, Lieutenant General Ulysses S. Grant ordered Major General Thomas to reduce his troops and dispense with the First Minnesota Heavy Artillery on August 23, two days before Charles was set to return.⁸¹ Nevertheless, in Nashville, Charles received an honorable discharge and was mustered out of service alongside the remaining men of Battery F on September 27, 1865. He walked away with \$14.95 and a bounty of \$33.33, minus \$3.80 for transportation costs, still due to him.⁸²

79 United States, Military Service Records, Letter from Charles H. Lindsley.

80 Dillon Carrol, discussion for HIST 630 seminar at Chico State, November 18, 2019.

81 United States Department of War, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, Series I, vol. XLIX Part II (Washington: Government Printing Office, 1897), 1105-06.

82 United States, Department of War, Company Muster-out Roll: 1st Minnesota Heavy Artillery, Battery F, Charles H. Lindsley, September 27, 1865.

Once back in Shelby, he got to work building his farm and establishing a family. Charles and Juliette’s utilitarian tendencies are evident in the length of time it took them to actually create a family. Although they married in 1864, their first child was not born until four years after they tied the knot. This gap is partially explained by Charles’ participation in the Civil War, however, his service to the Union only lasted eight months, including the 30-day furlough he received in late July. The newly married couple may have opted to postpone having children in order to focus on establishing a farm and a home. If this is true, Charles and Juliette Lindsley may have set up a viable farm by 1868. They gave birth to their first child, Carrie, that year and then the following year welcomed Lettie into the world. By the time of the 1870 census, Charles, his wife, and two daughters lived on a farm valued at \$2,500. Moreover, if Charles volunteered for the Union Army to benefit from the bounty he collected, his effort in doing so may have paid off as early as 1870. Not only did he feel established enough to have two children, the value of his estate was nearly six times greater than that of Lucien, who did not volunteer for the war.⁸³

To be sure, establishing oneself in Minnesota before or immediately after the Civil War would have been impossible without participating in a web of exchange that brought kinsmen and neighbors together.⁸⁴ Despite not having the exact date of their arrival, Charles’ family lived fairly close to him; his brother Lucien resided on a farm that was practically next door to his and their parents lived in Sterling, a township located a little over ten miles east of Shelby. Like in Wisconsin, all family members contributed to the day-to-day workload in and around the

83 United States. Census Bureau. Year 1870, Census Place: Shelby, Blue Earth, Minnesota.

84 Andrea R. Foroughi, “To Secure a Home for My Family,” *Minnesota History* 58, no. 3 (October 2002), 148.

farm. Having extended family nearby also meant having more laborers to help with the cultivation, harvest, and transport of produce. According to Andrea Foroughi, Levi N. Countryman, a recent arrival to Minnesota, “built a log cabin on his new claim which was adjacent to his brother and brother-in-law’s land.”⁸⁵ He specifically chose the plot because his extended family could provide much-needed farm and domestic labor. Moreover, since cash was not widely available until after the 1860s, Countryman and his family relied on an economy of debt and exchange where they traded with other settlers and often committed to repaying deficits in the future by reciprocating goods and services.⁸⁶ Charles and his extended family continued living in Minnesota through the end of the nineteenth century. Rhoda Gilman argues that Minnesota’s produce became tied to world markets during the Civil War as high wheat prices facilitated the success of commercial agriculture in the region. As a result, subsistence farming never became important in the state.⁸⁷ In 1880, Blue Earth County boasted 2,745 individual farms with 200,512 acres worth of improved land valued at \$6,495,200 in total.⁸⁸ By 1900, 70.3% of all available land in Minnesota was considered improved and the number of farms in Blue Earth increased to 3,186.⁸⁹

Railroads undoubtedly contributed to this situation. In the 1870s, “railroads and settlements complemented each other”; railroads were built to serve farm populations while

85 Ibid., 148-49.

86 Ibid., 153-55.

87 Gilman, “The History and Peopling of Minnesota,” 3.

88 United States, Department of the Interior, Census Office, *Report on the Productions of Agriculture as returned at the Tenth Census* (Washington: Government Printing Office, 1884), 121-22

89 United States, Department of the Interior, Census Office, *Census Reports* vol. V, part I, *Agriculture: Farms, Livestock, and Animal Products* (Washington: United States Census Office, 1902), 94, 142.

farmers settled lands “in accordance with projected or anticipated railroad construction.”⁹⁰ Despite the increasing availability of railroads in Minnesota, the Chicago, St. Paul, Minneapolis, and Omaha Railway garnered praise from almost everyone it did business with. The Omaha worked harder than most railroads to facilitate economic development in its service territory. It sold thousands of acres of land it acquired from federal and state land grants at fair prices because it was convinced that the Minnesota communities on its line offered enormous economic opportunities to “go-getting entrepreneurs.”⁹¹ Furthermore, it invested heavily in the development of freight and passenger cars which reduced the potential of grain car shortages during harvest seasons.⁹² The establishment of transcontinental railroad lines throughout the 1880s and 1890s further contributed to economic development in Minnesota. Gilman contends that “with luck, a new settler could pay for his acres in one or two seasons” thanks in large part to the railroads and Minnesota’s booming wheat market.⁹³

Meanwhile, Charles and Juliette’s family continued to grow with the birth of their third child, Raymond, in 1880. By then, Carrie and Lettie, twelve and ten years old respectively, attended school regularly enough to warrant writing “at school” for their occupation on the 1880 census. Juliette continued “keeping house” while Charles stayed involved with commercial agriculture as a farmer. The value of their estate and personal property as well as the realization that the children attend school frequently coupled with the fact that Juliette did not suffer through any miscar-

90 Richard V. Francaviglia, “Some Comments on the Historic and Geographic Importance of Railroads in Minnesota,” *Minnesota History* 43, no. 2 (1972), 58.

91 H. Roger Grant, “‘Minnesota’s Good Railroad’: The Omaha Road,” *Minnesota History* 57, no. 4 (2000), 198-202.

92 Ibid.

93 Gilman, “The History and Peopling of Minnesota,” 3.

riages suggests that the Lindsley family was (at the very least) healthy and doing well.⁹⁴ In 1900, they moved approximately 180 miles northwest to Morris, a railroad town in Stevens County. It is possible that Charles, a go-getting entrepreneur at heart, sold his piece of land in Shelby to chase more affordable options in the less developed sections of the state as those properties became available. A lack of evidence prevents us from forming a conclusive understanding of Charles’ motivations, however the records indicate that he was still in Blue Earth in 1890 but relocated to Stevens County sometime thereafter.⁹⁵ In Morris, Charles, now 59 years old, once again busied himself with establishing a farm and a home for his family. The census enumerator for the twelfth United States Census indicated that the Lindsley house was located on a farm and that a member of the family operated it.⁹⁶ This is no surprise since Charles again declared himself a farmer. What is surprising is that he apparently owned his home and farm in Morris while he mortgaged another piece of property in the Darren township of Stevens County.⁹⁷

94 United States, Census Bureau, Year 1880, Census Place: Shelby, Blue Earth, Minnesota; Roll: 615, Page: 398A; United States, Census Bureau, Year 1900, Census Place: Morris, Stevens, Minnesota; Page 7, The record states that Juliette gave birth to three children and that all the children are still living.

95 United States, Department of War, *Special Schedules of the Eleventh Census Enumerating Union Veterans and Widows of Union Veterans of the Civil War*, Year 1890, Location: Mankato, Blue Earth, Minnesota; Series Number M123, Record Group Number 15, Mankato is the county seat of Blue Earth.

96 United States, Department of the Interior, Census Office, *Instructions to Enumerators* (Washington: Government Printing Office, 1900), 41; United States, Census Bureau, Year 1900, Census Place: Morris, Stevens, Minnesota; Page 7.

97 United States, Census Bureau, Year 1900, Census Place: Morris, Stevens, Minnesota; Page 7, Enumeration District: 0265, FHL microfilm: 1240793; United States, Census Bureau, Year 1900, Census Place: Darren, Stevens, Minnesota; Page: 2.

Carrie, Charles’ oldest daughter, married John McNeil in 1894.⁹⁸ Charles may have sold his property in Shelby to help the newlywed couple acquire land and also relocated his own family to continue providing necessary support. He appears twice in the 1900 census schedules; once as the head of his own household in Morris and then again as the father-in-law to John McNeil, the head of household in Darren. The census enumerator indicated that the McNeils rented their home and farm while also relaying that Charles owned a home and mortgaged a farm.⁹⁹ Since Charles’ information does not match that of the census schedule for Morris and because he is placed within the McNeil household, we can deduce, albeit with uncertainty, that the property belonged to Charles. He rented or leased it to John and Carrie but still had a vested interest in the land and thus found himself in the vicinity when the census enumerator stopped by. This hypothesis is further supported if one considers his son; twenty years old and still single, Raymond could probably manage the farm in Morris while his father was away.¹⁰⁰ Nevertheless, this episode demonstrates Charles’ shrewdness because it highlights his ability to adapt and underscores his propensity to see himself and his family succeed.

With his son married and gone in 1903, Charles again found himself relocating further west.¹⁰¹ Once again, the lack of evidence prevents us from specifying his reason for moving or the exact date of his departure from Morris. Nevertheless, Charles, Juliette, and Lettie emigrated to Mandan, the county

98 United States, Census Bureau, Year 1900, Census Place: Darren, Stevens, Minnesota.

99 Ibid.

100 United States, Census Bureau, Year 1900, Census Place: Morris, Stevens, Minnesota.

101 United States, Census Bureau, Year 1910, Census Place: Bellingham Ward 3, Whatcom, Washington; Roll: T624_1673, Page: 13B; United States, Census Bureau, Year 1910; Census Place: Mandan Ward 3, Morton, North Dakota, Roll: T624_1144; Page: 18A; Enumeration District: 0121; FHL microfilm: 1375157

seat of Morton, by at least 1910. Unfortunately for them, Juliette passed away on January 22 of that year. Charles, now 69 years old and widowed, lived with his daughter in a house he mortgaged on First Street Northwest. Interestingly, Charles wrote “own farm” under the “Industry” section of the 1910 census which indicates that he might not have relinquished ownership of his properties in Minnesota.¹⁰² His pragmatism is on display anew considering that Charles managed to secure a source of income to provide for himself and his daughter despite his age and lack of support in North Dakota. Charles’ tenure in Mandan was ultimately short-lived; Lettie married Edward Furkey on June 11, 1910 and subsequently moved away.¹⁰³

Soon thereafter, Charles opted to move west once more, this time all the way to Butte County, California. After mourning the loss of his father in 1891, his mother in March 1905, his sister in December of that year, his brother Lucien the following year, and his wife in 1910, nothing was tying him to the prairie lands of the Midwest. His age also probably played a factor since he would be a retiree regardless of where he moved; the best he could do was choose a location with an established family member that also offered agreeable weather. The modernizing aspects of California may have also appealed to Charles who had already experienced drastic change within his lifetime.

During the Civil War, for example, railroads offered increased mobility when transporting personnel and supplies which became fundamental to the tactics of modern warfare in the proceeding decades.¹⁰⁴ To be sure, railroads were “part of the most dramatic innovation

102 United States, Census Bureau, Year 1910; Census Place: Mandan Ward 3, Morton, North Dakota.

103 United States, *North Dakota Marriage Records, 1872-2017* (Bismarck, North Dakota: State Historical Society of North Dakota), Burleigh County, Series Number 41779.

104 Govan and Livingood, “Chattanooga Under Military Occupation,” 26.

of the century”; they undeniably “constituted the most massive effort of public building as yet undertaken by man.”¹⁰⁵ While stationed at Chattanooga, Charles also had a firsthand look at the early days of Reconstruction. Freed people, having just escaped from captivity, wandered into Union camps seeking refuge by the thousands.¹⁰⁶ Douglas Egerton points out that although it was ultimately unsuccessful, Reconstruction ushered in a dramatic transformation of U.S. society as African Americans gained the right to vote and were recognized as citizens for the first time in the history of the United States.¹⁰⁷ The late nineteenth century also witnessed a handful of smaller yet deeply significant developments that profoundly moved the world toward what we consider to be modern society. Eric Hobsbawm points out that “by the 1880s large-scale generation of electricity and the internal-combustion engine were both becoming practicable.”¹⁰⁸ Furthermore, although “the moving photograph did not become technically feasible until about 1890,” by 1910, “there were 26 million Americans who went to see motion pictures every week.”¹⁰⁹ Indeed, the middle classes developed out of the prosperity of the second half of the nineteenth century when individuals began to “demarcate themselves as sharply as possible from the working classes” by adhering to “collective recognition signs” that stressed the importance of the education they received, the places they lived in, and the lifestyles they enjoyed.¹¹⁰

In Butte County, the turn of the century proved a momentous time for industrial development and capital investment. From 1900 to 1918,

¹⁰⁵ Hobsbawm, *The Age of Empire*, 27.

¹⁰⁶ Govan and Livingood, “Chattanooga Under Military Occupation,” 36-37.

¹⁰⁷ Douglas R. Egerton, *Wars of Reconstruction*, Reprint edition (Bloomsbury Press, 2015).

¹⁰⁸ Hobsbawm, *The Age of Empire*, 27.

¹⁰⁹ Ibid., 238-39.

¹¹⁰ Ibid., 181.

“Butte County leaped into prominence as one of the richest counties of the state” as “a great railroad system built its lines through the Feather River Canyon” and thus brought “to the rich valley lands of the county unexampled facilities for the transportation of their increasing products.”¹¹¹ Within the first two decades of the twentieth century, “the people saw the county advance to a place of power, prestige, and commanding influence among the counties of the state.”¹¹² In Chico, the period from 1900 to 1918 constituted one of the most transformative periods in the city’s history. By the end of 1918, Chico evolved from a town of 2,640 to a city of 12,000 people.¹¹³ During this time, the “Municipality began a program of large municipal improvements;” it allocated funds for street ameliorations as well as the construction of a city hall, a modern sewer system, and a fire department.¹¹⁴ As part of its street improvement program, the city government erected sidewalks throughout “all portion of the city that were included in the incorporated limits.” As a result of these enhancements, “modern business structures arose” complete with “a modern electrolier system for lighting the business section of the city.”¹¹⁵ Furthermore, this period also witnessed the establishment of Bidwell Park, “one of the most magnificent public parks in the state.”¹¹⁶

Charles Lindsley ventured to Chico, California amid these transformations.¹¹⁷ The change

¹¹¹ George C. Mansfield, *History of Butte County, California: With Biographical Sketches of the Leading Men and Women of the County Who Have Been Identified with Its Growth and Development from the Early Days to the Present* (Los Angeles, California: Historic Record Company, 1918), 340.

¹¹² Ibid.

¹¹³ Ibid., 361.

¹¹⁴ Ibid.

¹¹⁵ Ibid., 362.

¹¹⁶ Ibid., 363.

¹¹⁷ Butte County, Chico Cemetery; Interment Records, He arrived in the city sometime in 1912, the cemetery recorded June 6, 1923 for the day of his

of scenery appears to have prompted a parallel change of identity for our intrepid subject. In the 1920 census, he reported England as his father’s place of birth although every other schedule he appears on beforehand lists New York as the birthplace.¹¹⁸ Interestingly, of the fifty individuals listed alongside Charles, only nine had parents that were born in the United States. Perhaps Charles decided to alter his family history to better integrate himself into the community. Or perhaps the census enumerator simply made a mistake. Nevertheless, Charles began to describe himself as a “retired capitalist” or “retired merchant” after moving to Chico.¹¹⁹ The self-proclaimed title is not especially noteworthy in itself; however, it begs the question: why not refer to himself as a retired farmer?

The ongoing modernization and urbanization of Chico and the United States may help provide some answers. In the context of the period, where increasing numbers of individuals were leaving farms to work and live in cities, Charles may simply be embracing the times. Alternatively, he managed to purchase several parcels of land while living in Chico. Thus, he may be referring to his new occupation if he rented out the land or used it for other commercial purposes. To be sure, Charles demonstrated pragmatic entrepreneurial tendencies throughout his career as a farmer, so calling himself a merchant or capitalist is not too far from reality. Furthermore, throughout his time in Chico, and maybe even before his arrival, Charles endorsed the Foster-Milburn Company product, Doan’s Kidney Pills, in a series of reoccurring newspaper adverts. In the advertisements, C. H.

death and mentioned that he was in the city for eleven years total.

¹¹⁸ United States, Census Bureau, Year 1920: Census Place: Chico, Butte, California: Roll: T625_94; Page: 6A.

¹¹⁹ *The Morning Union* (Grass Valley), July 2, 1913; *Oroville Daily Register*, July 2, 1913; *Chico Record*, April 10, 1917.

Lindsley, a “highly respected resident” and “retired merchant,” testifies that he has “been using Doan’s Kidney Pills off and on . . . for the past twenty years.” He claims that he takes the pills when he catches a cold because “it seems to settle in [his] kidneys and bring on attacks of lame back.” The pills, which are manufactured in New York, always “quickly relieve and benefit [him] in every way.”¹²⁰ Charles’ new title is befitting of a man who likely gets paid to endorse products that originated in a distant land. Although Charles continuously demonstrated his shrewd ability to seize opportunities, his endorsement of a potentially ineffective medication juxtaposes sharply with his history of close family relations and endeavors in commercial agriculture.

Notwithstanding this sharp divergence of character, Charles moved to Chico to be near family who could help him establish a new home in the burgeoning city. His youngest sister, Idella, had been living in the city with her husband and four children since at least 1910.¹²¹ She was in an opportune position to assist her older brother because her husband, Chauncey Bierce Johnson (commonly referred to as C.B. Johnson in most documents) worked as a contractor who specialized in building houses.¹²² From 1919 to 1921, Charles purchased three parcels of land in Chico; one was located on the corner of Ninth Street and Salem, one was on the corner of Ninth Street and Cherry, and the third was located across the street from the second property where it fronted Ivy.¹²³ Charles contracted C.B. to build a one-story dwelling house on the latter property which

¹²⁰ *Chico Record*, October 20, 1916; Ibid., February 23, 1917; Ibid., April 10, 1917; Ibid., June 20, 1922.

¹²¹ United States, Census Bureau, Year 1910; Census Place: Chico, Butte, California; Roll: T624_73; Page 27B

¹²² Ibid.

¹²³ Butte County, Clerk-Recorder, Deeds, 17: 260; Ibid., 166: 144; Ibid., 198: 253.

he completed on July 24, 1923.¹²⁴ According to Sanborn Fire Insurance Maps, the property on 9th and Salem had a dwelling situated on it at the time of purchase that dates back to 1886.¹²⁵ Charles likely lived in this house while he awaited the completion of the house he hired C.B. to construct. Unfortunately, Charles passed away forty-eight days before C.B. finished the construction of his house.

While accumulating property and endorsing Doan's pills, Charles was active in Chico society. As an honorably discharged veteran of the Civil War, he became a prominent member of the Grand Army of the Republic (G.A.R.) local Halleck Post, No. 19 which organized on April 2, 1881 with George S. Snook as commander.¹²⁶ Not only did the G.A.R. provide comradeship and space for Civil War veterans to socialize, it promoted their political interests, provided relief for struggling members and their widows, created retirement homes, and helped pay for their funeral services.¹²⁷ As a member of the G.A.R., Charles was obligated to contribute support to his comrades. When a local veteran passed away, Charles was one of six pallbearers during the funeral service.¹²⁸ He also showed support to G.A.R. members by showing up to their celebrations, as was the case in March 1923 when he attended R.N. Norris' eighty-second birthday party.¹²⁹ On January 9, 1915, the local Halleck Post named Charles Lindsley the Junior Vice

124 Butte County, Clerk-Recorder, Mechanics Liens, Additional Records, G1: 155.

125 *Sanborn Fire Insurance Map from Chico, Butte County, California*. (Sanborn Map Company, 1886), 11; *Sanborn Fire Insurance Map from Chico, Butte County, California*. (Sanborn Map Company, 1921), 43.

126 Harry Laurenz Wells, *History of Butte County, California* (San Francisco: H.L. Wells, 1882), 232.

127 "Grand Army of the Republic History," *Sons of Union Veterans of the Civil War* (blog), December 13, 2013, http://www.suvcw.org/?page_id=167.

128 *Chico Record*, April 19, 1913.

129 *Ibid.*, March 6, 1923.

Commander.¹³⁰ In September 1916, he was part of a committee the G.A.R. and the Women's Relief Corps (G.A.R.'s auxiliary group for women) put together to organize a banquet for the Department Commander and Adjunct General.¹³¹ By January 5, 1923, he was promoted to Quartermaster Sergeant.¹³²

Charles met his second wife, Margaret Woolverton through his connections in the G.A.R. She was a local widow and a member of and color bearer for the Halleck Women's Relief Corps (W.R.C.). She and Charles married on July 2, 1913 at the Fourth Street Methodist Church. Members of the W.R.C. decorated the church "of a patriotic nature" for the occasion and subsequently celebrated the marriage with G.A.R. and W.R.C. members that night.¹³³ Newspapers in the surrounding cities reported on the Lindsley-Woolverton marriage throughout the week.¹³⁴ He was seventy-two and she was sixty-six at the time of their engagement. Nevertheless, Charles "appeared as happy and as nervous as a young bridegroom in his twenties."¹³⁵ Whether Charles and Margaret were in love is hard to say. For certain, the two were highly compatible because they had similar interests and probably kept a similar group of friends. Both were previously married, were members of Chico's First Methodist Church, and were heavily involved with G.A.R. and W.R.C. functions.¹³⁶ Charles certainly cared for Margaret's well-being because he made sure that his will included her among the beneficiaries of his estate. Specifically,

130 *Ibid.*, January 9, 1915.

131 *Ibid.*, September 23, 1916.

132 *Ibid.*, January 5, 1923.

133 *Ibid.*, July 2, 1913.

134 *The Oroville Mercury*, July 1, 1913; *The Morning Union* (Grass Valley), July 2, 1913; *Oroville Daily Register*, July 2, 1913; *Chico Record*, July 3, 1913; *The Sacramento Union*, July 4, 1913.

135 *The Oroville Mercury*, July 1, 1913.

136 Butte County, Chico Cemetery; Interment Records, the cemetery listed Charles and Margaret as members of the First Methodist Church.

Margaret was to inherit the income derived from the sale of his property "so that she may be well provided for."¹³⁷

Despite his relationship with Margaret, Charles found time to contribute to his community in a variety of ways. Since he was a member of the congregation, he volunteered his time at the First Methodist Church. On one occasion in November 1914, Charles was busy repairing the front of the church when "a hobo passed by and took a watch and chain from the pocket of a vest" that Charles had laid aside when he started work.¹³⁸ Moreover, he also served on a jury that acquitted a man who was on trial for his connection to the deaths of two people during the Barber Hotel fire of June 19, 1913.¹³⁹ Charles also indirectly contributed to his community by donating to several causes. In 1917, he bought "liberty bonds" to help the United States sustain its war efforts during World War I.¹⁴⁰ That same year, he donated money to the Y.M.C.A. so that it could continue providing support for people "in the camps and at the battle fronts" of the war.¹⁴¹ In 1918, he contributed \$100 to the development of hydroelectric projects on the Feather River.¹⁴²

Charles lived in Chico until June 8, 1923 when he died of duodenum cancer.¹⁴³ Before passing away, he appointed his brother-in-law, C.B. Johnson, as the executor of his last will. C.B. made sure that Charles' grandchildren received \$100 each, that Margaret collected the income from the sale of his properties, and that his children inherited the remainder of his estate. Charles' will demonstrates his pragmatism because it makes sure that

137 Butte County, Clerk-Recorder, Record of Wills, F: 338.

138 *Chico Record*, November 13, 1914.

139 *The Oroville Mercury*, June 25, 1913; *Chico Record*, June 20, 1913.

140 *Chico Record*, June 9, 1917; *Ibid.*, October 26, 1917.

141 *Ibid.*, November 14, 1917.

142 *Ibid.*, October 22, 1917.

143 Butte County, Chico Cemetery; Interment Records, Lindsley, Charles H.

everyone in his family, including grandchildren whom he perhaps never met, benefitted from his lifetime of hard work. This is especially apparent considering that he spent the last two years of his life loaning money to his children. Unbeknownst to them, he stipulated that they would inherit his personal property on August 24, 1920. Upon his death, C.B. Johnson found \$1857 worth of promissory notes in his personal property that his three children had given to him after he loaned them money.¹⁴⁴ His final act of pragmatism near the end of his life was to help his family by liberally giving them money and then ultimately forgiving their debt.

On June 8, 1923, his brothers and sisters from the G.A.R. and the W.R.C. joined Margaret to mourn the loss of their "beloved and honored comrade."¹⁴⁵ He was interred in the Chico Cemetery in the G.A.R. block next to other Civil War veterans who passed away in the city. Within a single lifetime, Charles experienced some of the most formative moments in U.S. history. One example of the dramatic transformations that took place during Charles' life is the fact that by 1880, each new generation of children grew taller than their parents.¹⁴⁶ Charles for one, was only five foot three inches tall when he reached adulthood and volunteered for the Civil War.¹⁴⁷ Notwithstanding his stature, he proved more than capable of navigating the waters of change as he moved west from his birthplace in New York to his final resting place in California. Along the way, he never failed to seize good opportunities as he pragmatically dealt with an ever-changing world.

144 Butte County, Clerk-Recorder, Record of Wills, F: 338.

145 *Chico Record*, June 9, 1923

146 Hobsbawm, *The Age of Empire*, 29.

147 United States, Department of War, Muster and Descriptive Roll, 1st Minnesota Heavy Artillery Battery F, February 11, 1865.

This is a paper written by a Latin American Studies undergraduate student for the seminar class LAST495W: Native Latin Americas and Indigenismo. Their research of contemporary issues in indigenous Latin America was conducted under the direction of their faculty mentor Professor Stephen Lewis. This paper used the American Psychological Association (APA) Style, which is typical for papers in this discipline and utilizes in-text citations.

Obesity in Mayan Communities and the Increased Consumption of Processed Foods

Juliana Palmas Vera

Introduction

Standing as one of the leading countries affected by both high levels of obesity and diabetes is Mexico (Barquera and Rivera, 2020). Since 2016, Mexico has declared a public health crisis, with more than 72 percent of its adult population diagnosed as overweight, obese, or diabetic (Barquera & White, 2018). Since 2010, the Mexican government has implemented multiple policies and programs in an effort to combat the consumption of industrialized and processed foods but obesity is still a problem. Barquera and Rivera (2020) attribute these persistently high rates to pressure from multinational food companies whose presence is strong in the Mexican economy.

Obesity has managed to infiltrate even the most rural areas including indigenous communities through globalization (Pérez-Izquierdo et al., 2020). Among the most affected indigenous communities are the rural Mayan communities in the Yucatán Peninsula, Mexico. For decades, indigenous communities have undergone a major transition to a tourism-based economy that has caused significant changes in their diet which then impacts individual body mass index (BMI) (Leatherman et al., 2010). Mayan communities along the Yucatán Peninsula have been exposed to globalization and the tourism industry due to popular tourist destinations like Cancún and Mérida. This exposure has led Mayan communities in Yucatán to steer off from a traditional healthy milpa diet and turn to industrialized foods. Globalization has incited a disproportionate amount of consumption of

soft drinks and *comida chatarra* (junk foods) all over Mexico, contributing to the country's climbing rates of obesity among adults and children, and Mayan communities (Colchero et al., 2015). In the last decades, obesity rates within Mayan communities have spiked. To examine this trend, this manuscript explores the following research questions:

- What have been the policy and economic drivers of the change in diet in Mexico?
- How has the consumption of industrialized foods increased obesity and other poor health outcomes among Mayan adolescents and adults?

Processed Foods Within my Family and Rural Community

This topic is deeply personal to me. Having traveled to Mexico within the last five years, I have witnessed the increase in consumption of soft drinks like Coca-Cola within the community of my family on the outskirts of Guanajuato, Mexico. It was not until I visited my community of El Armadillo, Guanajuato in December of 2021 that I realized the strong grasp Coca-Cola has on the Mexican population. At my grandmother's dinner table, a two-liter Coca-Cola bottle was present every day along with other *comida chatarra*. During the 1960s and 70s, my grandmother grew up in a poor rural town, daughter to poor farmers and sister to seven siblings who had little to no economic support. Since she was a child, my great-grandparents could not provide three meals a day for my grandmother and

her six siblings. Most meals came from my great-grandfather's crops, what he planted in other's lands and what they could afford to buy. My grandmother recounts, "We ate lots of broccoli and cauliflower as it was what your great-grandfather planted most. There were times when he planted foods like potatoes, onions, and *quelite* (greens) in neighbors' lands, he was allowed to bring some home and that's what we ate during our childhood." My grandmother's family and herself rarely ate any processed foods or drinks and occasionally ate meat approximately once a week or less. "From what I remember my mother always gave my siblings and me tea for breakfast, she cooked it every morning for my father with his *pan dulce* (sweet bread/Mexican pastry). We had a cup of lemon tea or cinnamon tea at all times of the day even before we went to sleep. It was something we drank daily," recounts my grandmother. "We knew what we were putting into our bodies because your great-grandfather planted and harvested our food. We knew that it was good for us because that was all there was for us to eat. Even with meat we knew that whoever we bought beef or pork meat from was feeding them healthy plants like alfalfa. We knew nothing about processed foods, you wouldn't be able to find any of that in my mother's house."

Since growing up, my grandmother Margarita has experienced a drastic transition from a healthy diet to a present diet filled with fatty components and largely processed foods. Presently at 66 years, my grandmother still cooks for the entire house. She prepares dishes with nutritious vegetables but also prepares meat and fried dishes frequently about three or four times a week. For example, pozole (hominy and meat stew) with pork, *carnitas* (simmered pork in oil), *gorditas* (maize tortillas filled with meat and vegetables), *flautas* (fried rolled tortillas stuffed with meat and vegetables), etc. My grandmother explains,

"Now I cook many of my dishes with oil and we eat a lot more meat because we can buy it in one of the small shops in town. Those types of products are more accessible. Before, when I was a teenager, we had to go to more populated towns where they sold that, where it took us at least two hours to walk. But now that it is sold in the town, it is frequently used in our cooking." Another issue is the abnormally large consumption of soft drinks within my grandmother's household and our community, where Coca-Cola is always available more often than water. Every morning, a *vendedor* (seller) rides around town in their vehicle selling twenty-liter gallons of water. However, once they leave town, people must buy smaller two-liter water bottles from the small local shops for the rest of the day. Once there are no water bottles available to purchase, community members have to rely on Coca-Cola or juice to drink until the next morning, "There are also times when our town is having a party or at family parties when water runs out or there wasn't water to begin with. But there is never a party or family get-together where there isn't Coca-Cola or soda in general." Unfortunately, my grandmother Margarita now constitutes part of the 14.1 percent of the Mexican population that has Type 2 Diabetes.

Mexico's Legislative Efforts to Combat Obesity

Since 1980, the Americas have become the region with the highest rates of obesity and Type 2 Diabetes (T2D) in the world (Barquera et al., 2018). It has been found that Mexico is a leading consumer of excessive sugar drinks and nonessential food on a global scale (Colchero et al., 2015). Obesity rates have further accelerated following the ratification of NAFTA in 1994. According to Dr. Simón Barquera and Dr. Juan A. Rivera from the Instituto Nacional de Salud Pública (INSP), "Today 23.1 percent of Mexico's

population total dietary energy comes from ultra-processed foods” (Barquera & Rivera, 2020, p. 746). Over two-thirds of the population exceeds the recommended amount of consumption of sugar and processed products. Abdominal obesity is present in 81.6 percent of all adults and morbid obesity (when weight is 80-100 pounds above ideal body weight) in 3.6 percent of adults (Barquera & Rivera, 2020). Additionally, among children between the ages of 5 and 19, the obesity rate is one of the highest globally with 34 percent diagnosed as overweight or obese. With a large portion of Mexico’s population classified as overweight or obese, 14.1 percent of the population has been diagnosed with type II diabetes (T2D) and 19.1 percent diagnosed as pre-diabetic. (Barquera et al., 2018, p. 2). These alarming statistics motivated the Mexican Congress to begin a plan of action.

In 2010, the Mexican government began to design a program to combat the obesity epidemic. The initiative took the form of an excise tax on sugar-excessive soft drinks and nonessential foods—more often known as dense energy foods—beginning in 2014 under President Enrique Peña Nieto’s administration. Sweetened drinks received an approximate 10 percent tax increase (excise tax of \$1 Mexican peso per liter) and nonessential junk food with energy density greater than or equal to 275 kilocalorie/100g received an 8 percent food tax increase (Taillie et al., 2017). These foods include salty snacks, chips, candy, pastries, cereal-based products with substantial sugar, etc. Additionally, the mentioned junk foods and soft drinks were banned from being sold in schools. Taking nutritious awareness further, in January 2020, Mexico’s Congress approved front-pack labeling of nonessential foods as warning signs. Often these labels read “excessive calories,” “excessive sugar,” “excessive saturated fats,” etc. Surprisingly, these label

warning signs have gained support from the public.

However, the tactic has been opposed by food industries and suspicious cyber groups going as far as threatening advocates in favor of the soda tax and label warnings via mysterious text messages. Since the initiation of the sugar beverage and nonessential foods excise tax in 2014, a study on household purchases has shown that after two years nonessential junk food purchases per capita have decreased by 6 percent, while sugar-excessive beverage purchases per-capita have decreased by 5.5 percent within the first year of 2014 followed by 9.7 percent of the following 2015 year (Arteaga et al., 2017, p. 4; Colchero et al., 2015). Although these measures have been taken, it’s important to note that the Mexican National Health’s budget has suffered drastic cuts for the past ten years. As of 2020, the health budget only represents 2.3 percent of the federal budget under President Andrés Manuel López Obrador (Barquera & Rivera, 2020).

Gradual Decline of the Milpa Diet in the Yucatán

Despite the various programs and policies implemented by the Mexican government, indigenous communities like Mayan peoples now gravitate towards junk foods and have abandoned their traditional milpa diets that have been present since Mesoamerican times (Otero Provost et al., 2017). The vast majority of Mayan towns and municipalities depended on milpa harvesting for their food until the last five decades (Otero Provost et al., 2017). Milpa is an agricultural practice where a multitude of different crops are grown in the same area or side-by-side. However, the system is based on maize. A variety of vegetables are sown with maize (a source of complex carbohydrates), such as beans, a source of vegetarian protein, and chiles and squash, which are sources of trace

minerals (Levinson, 2014). The polyculture system gives community members and families food security, a balanced diet, and physical activity as well. As a Mayan woman participant of a Type 2 Diabetes study in rural community Tope, Yucatán reminisces, “Most of the time they just ate vegetables and beans with their tortillas. And then, everything was from the [home] garden or the milpa. You grew your vegetables on your land, you made your masa and your tortillas yourself, and you raised your own chickens or turkeys.” (Frank & Durden, 2017, p. 67). Additionally, the manual labor of maintaining milpa crops was and is a form of exercise for many families. . In order to maintain milpa crops, husbands often spent nearly full days tending to their crops withstanding exhausting labor. Wives also had to tend to vegetable gardens and their responsibilities at home. The same participant in the Tope, Yucatán study attributes obesity to less physical activity: “But instead you can sit around all day and watch TV and drink Coca [-Cola]. And that is what people want. But then they aren’t exercising, and they are eating more fatty foods. That is why everyone is getting fat.” (Durdén, 2017, p. 67).

Milpa agriculture began to slowly vanish in 1970 when the Mexican federal government began to build highways in rural areas, connecting them to developing urbanized cities like Mérida and Cancún. The connection to growing cities gave the Mayan peoples the opportunity to migrate and alternate seasonal jobs between the city and the countryside (Leatherman et al., 2010). At the same time, the increase in immigration and population “...led to an increase in the pressure exerted on the soil, which led in the 1990s to a reduction in fallow time in the land dedicated to the milpa.” (Otero Provost et al., 2017, p. 4). However, the reduction in fallow (a farming technique where land is left with-

out sowing for one to two years while land regenerates) instead caused a decrease in soil fertility and accelerated the growth of weeds. In an effort to combat the contagious weeds, farmers used herbicides, which unfortunately affected the cultivation of squash, beans, and chile. This forced the polyculture agricultural system into a monoculture of maize, pulling apart the once nutritious foods that consisted in milpa diets. Seasonal employment was becoming more common for Mayan workers in Cancún and Mérida which led workers and families of Mayan farmers to later permanently reside and join the workforce in the developing cities leaving behind milpa production (Otero Provost et al., 2017).

Emergence of *tienditas de abarrotes*

The disappearance of milpa production and the emergence of *tienditas de abarrotes* essentially opened the portal to processed foods and obesity in Mayan communities (Otero Provost et al., 2017). Coincidentally, within only five years of the ratification of NAFTA in 1994, a study conducted in a region known as the *maize region* (a region that consists of twenty-five Mayan municipalities) in the center-east of the state of Yucatan determined that the number of small local grocery stores increased in number from 26, 247 (1999) to 29, 948 (2004) (Otero Provost et al., 2017, p. 5). Additionally, according to Otero Provost’s article, their study determined that in three of the twenty-five municipalities of Yaxcabá, Sotuta, and Chikindzonot, a growth of commercial establishments of more than 15 percent was seen (Otero Provost et al., 2017). Unfortunately, the expansion of these small local grocery stores didn’t supply or provide Mayan communities with diverse nutritious foods once a part of their diets. Essentially, the transition to industrialized foods with low nutritional value directly correlates to the loss

of traditional agricultural practices of rural communities (Otero Provost et al., 2017).

Obesity in Rural Mayan Adults

Yucatán's health as a state has deteriorated as the National Health and Nutrition Survey of 2006 shows that 74.2 percent of adults (above twenty years of age) in urban regions and 76.3 percent in rural areas were classified as overweight or obese (Becerril, 2013). Even the smallest rural Mayan communities in Yucatán have been infiltrated by obesity with alarming numbers. In Marín's study, an investigation was conducted in the small Mayan community of Dzutóh belonging to the municipality of Tixméhuac, Yucatán. In this community of 126 inhabitants, traditional celebrations like religious ceremonies and also the cultivation of milpa crops still continue. Although the community of Dzutóh actively produces milpa crops, the excessive consumption of processed foods has influenced a nutritional imbalance in their diets. It's important to note, the community is also classified in the range of extreme poverty. In the study, the researchers weighed and took the height of 109 of the 126 Dzutóh inhabitants and calculated their health status according to the *índice de masa corporal* (IMC) or body mass index (BMI). Of the 109 participants, 20 men and 36 women were classified in the adult group (older than 19 years of age). According to the weight and height ratio and the BMI scale of the adult group, it was determined that of the 56 adults, 80 percent of men and 86.1 percent of the women were obese while only 15 percent of men and 2.8 percent of women in the adult group were determined to have a normal BMI (Marín et al., 2013, p. 75).

Additionally, the types of industrialized and traditional foods were recorded along with the number of times eaten a week. Among the foods that the study survey provides is *refres-*

co embotellado (bottled soft drink) to which 9 of 21 respondents claimed to drink daily, 8 out of 21 respondents claimed to drink three to four times a week and 4 of 21 respondents claimed to drink the beverage one to two times a week (Marín et al., 2013, p. 76). On the other hand, the traditional indigenous beverage of *atole de masa* (a warm cornmeal drink) was also included in the study where 9 out of 20 respondents claimed to drink daily, 0 respondents claimed to drink three to four times a week, and 11 out of 20 respondents claimed to drink the beverage one to two times a week (Marín et al., 2013, p. 78). The food survey concluded that dietary changes in rural communities are leading to frequent consumption of industrialized foods. Rural Mayan communities across Yucatán are unfortunately experiencing the same health epidemic as the citizens of Dzutóh.

Eating Habits of Rural Mayan Adolescents

Since 2006, studies have shown that rates of obesity have increased in Yucatán adolescents in urban localities from 43.5 percent in 2006 to 42 percent in 2012 and jumping to an astonishing 52 percent as of 2019 in rural localities (Pérez-Izquierdo et al., 2020, p. 4424). In the previously mentioned study, a total of 292 students between the ages of 12 and 14 enrolled in 4 high schools in the localities of Uayalceh, Mucuyché, Temozón Sur, and central Abalá in the municipality of Abalá, Yucatán (composed of 8 distinct indigenous localities, which 40 to 60 percent of the entire population fall between poverty and extreme poverty). Students were then weighed and measured to determine their BMI and a select few were given a food consumption frequency questionnaire to determine their daily dietary intake. Of the 292 students, BMI scores determined that 58.2 percent of participants were classified as normal and 41.4 percent were classified as overweight and obese (Pérez-Izquierdo et al.,

2020, p. 4428). Of the students whose BMI was in the range of overweight and obese, 58 students were randomly selected and given a food consumption frequency questionnaire. The results of the questionnaire demonstrate that over 50 percent of those surveyed consumed industrialized unhealthy foods at a high or moderate frequency. Sugar showed an 83 percent consumption rate, mayonnaise a 74 percent consumption rate, juice a 64 percent consumption rate, and soda beverages a shocking 88 percent consumption rate (Pérez-Izquierdo et al., 2020, p. 4430-4431). An additional focus group interview was conducted with the students to understand their perceptions of what they consumed throughout the day.

Three participants from the "Daniel Ayala Pérez" high school in the central municipality of Abalá, Yucatán recall what they consume at school:

...at school we eat what they sell, and what they sell can be tortas de carne asada, tamales, hamburgers, spaghetti, nissin® soup, panuchos, hot dogs, sandwichón, soufflé, garnachas, tacos, rice pudding, empanadas, we also eat chips and cookies, ...we drink water, tamarind water, horchata water, hibiscus water, sweetened juices (friolín®), sometimes Coca-Cola®... We don't like those foods we eat, because they don't have flavor, that's why we buy the chips and cookies. And are those foods that you eat at school good? No, because they have a lot of calories, they have a lot of saturated fats and condiments... So, why do they buy those foods? Because there is nothing else... (participation of students from the three school grades). (Pérez-Izquierdo et al., p. 4433).

The interview discussions allow us to infer that Mayan adolescents are aware of the threats and diseases that the consumption of industrialized foods can pose to their health, but they also don't have other options whether it be the availability of healthier meals or the financial support to buy fresh foods.

Conclusion

While there has been some success among public health officials to combat poor health outcomes, obesity and diabetes remain significant health issues in Mexico (Barquera and White, 2018). For decades globalization and the influence of industrialized foods have slowly deteriorated the health of indigenous communities in Yucatán, México, especially in Mayan communities. Mayan communities have steered off the traditional milpa diet in favor of processed food produced and distributed on a global scale. Although there are very few available studies on the impact of the transitional diet in indigenous communities, it is clear that the urbanization in Yucatán during the 1970s led indigenous communities to the exposure of diseases previously uncommon to them. It is clear that the enactment of NAFTA coincided with the incremental availability of modern industrialized foods in Mayan indigenous communities. Mexican president Andrés Manuel López Obrador has imposed budget cuts to the federal health budget as of 2020. Unfortunately, there is no evidence that the Mexican government will carry out effective legislation and programs that will help Mayan communities combat the health crisis or if indigenous peoples will continue to be engulfed by the effects of industrialized foods.

References

- Arteaga, J., Cesar, Flores, D., & Luna, E. (2017). The effect of a soft-drink tax in Mexico: a time series approach. *Munich Personal RePEc Archive*, 80831, 1-11. https://mpra.ub.uni-muenchen.de/80831/1/MPRA_paper_80831.pdf
- Barquera, S., & Rivera, J. A. (2020). Obesity in Mexico: rapid epidemiological transition and food industry interference in health policies. *The Lancet Diabetes & Endocrinology*, 8(9), 746–747. [https://doi.org/10.1016/s2213-8587\(20\)30269-2](https://doi.org/10.1016/s2213-8587(20)30269-2)
- Barquera, S., Schillinger, D., Aguilar-Salinas, C. A., Schenker, M., Rodríguez, L. A., Hernández-Alcaraz, C., & Sepúlveda-Amor, J. (2018). Collaborative research and actions on both sides of the US-Mexico border to counteract type 2 diabetes in people of Mexican origin. *Globalization and Health*, 14(1), 1–10. <https://doi.org/10.1186/s12992-018-0390-5>
- Barquera, S., & White, M. (2018). Treating Obesity Seriously in Mexico: Realizing, Much Too Late, Action Must Be Immediate. *Obesity*, 26(10), 1530–1531. <https://doi.org/10.1002/oby.22296>
- Becerril, Javier. 2013. «Agrodiversidad y nutrición en Yucatán: Una mirada al mundo maya rural». *Región y sociedad* 25 (58). <https://doi.org/10.22198/rys.2013.58.a126>
- Colchero, M., Salgado, J., Unar-Munguía, M., Hernández-Ávila, M., & Rivera-Dommarco, J. (2015). Price elasticity of the demand for sugar sweetened beverages and soft drinks in Mexico. *Economics & Human Biology*, 19, 129–137. <https://doi.org/10.1016/j.ehb.2015.08.007>
- Frank, S. M., & Durden, T. E. (2017). Two approaches, one problem: Cultural constructions of type II diabetes in an indigenous community in Yucatán, Mexico. *Social Science & Medicine*, 172, 64–71. <https://doi.org/10.1016/j.socscimed.2016.11.024>
- Leatherman, T. L., Goodman, A. H., & Stillman, T. (2010). Changes in stature, weight, and nutritional status with tourism-based economic development in the Yucatan. *Economics & Human Biology*, 8(2), 153–158. <https://doi.org/10.1016/j.ehb.2010.05.008>
- Levinson, I. W. (2014). Mexican Cuisine - From the Maya to McDonalds. *History Faculty Publications and Presentations*. 44, 1–5. https://scholarworks.utrgv.edu/hist_fac/44/
- Marín Cárdenas, Alina Dioné, Georgina Sánchez Ramírez, & L. Liliane Maza Rodríguez. Prevalencia de obesidad y hábitos alimentarios desde el enfoque de género: El caso de Dzutóh, Yucatán, México. *Estudios Sociales XXII*, no. 44 (July 2013): 65-90. http://www.redgtd.org/CENTRODOC/BD_ARCHIVOS/articulo_revES_CIAD_ejemplo_dietalimienticia.pdf
- Otero Prevost, D. E., Gurri García, F. D., Mariaca Méndez, R., & Guízar Vázquez Jr., F. (2017). La incorporación y el aumento de oferta de alimentos industrializados en las dietas de las unidades domésticas y su relación con el abandono del sistema de subsistencia propio en las comunidades rurales mayas de Yucatán, México. *Cuadernos de Desarrollo Rural*, 14(80). <https://doi.org/10.11144/javeriana.cdr14-80.iaoa>
- Pérez-Izquierdo, O., Cárdenas-García, S., Aranda-González, I., Perera-Ríos, J., & Castillo, M. del R. B. (2020). Consumo frecuente de alimentos industrializados y su percepción en adolescentes indígenas Mayas con sobrepeso y obesidad. *Ciência & Saúde Coletiva*, 25, 4423–4438. <https://doi.org/10.1590/1413-812320202511.35112018>
- Taillie, L. S., Rivera, J. A., Popkin, B. M., & Batis, C. (2017). Do high vs. low purchasers respond differently to a nonessential energy-dense food tax? Two-year evaluation of Mexico's 8% nonessential food tax. *Preventive Medicine*, 105, S37–S42. <https://doi.org/10.1016/j.ypmed.2017.07.009>



STUDENT ABSTRACTS

UNDERGRADUATE STUDENT ABSTRACTS

Factors Associated with Farmers' Market Consumers' Perceptions

Jovita Avila

Farmers' markets have increased throughout the United States over the years. The markets provide a place for farmers and other vendors to sell directly to consumers. The current study investigated factors associated with consumers' perceived benefits and disadvantages of shopping at farmers' markets. Consumer perceptions of using CalFresh benefits at the market were also examined.

A cross-sectional study design was used for this study. A survey was distributed at the local Northern California farmers market and 24 participants completed the survey. Descriptive statistics and independent samples t-tests were used for data analysis.

Gender, ethnicity and income levels were significant factors associated with farmers' market perceptions. Males had a more positive attitude compared to females about product variety availability and preference of local over store products. Male participants also believed local fruits and vegetables taste better than store bought and that they could successfully purchase a week's worth of fruits and vegetables for themselves and their family. When comparing non-Hispanic white and other groups, non-Hispanic white participants believed they could purchase a week's worth of food at the farmers' market. Lower income participants had more positive attitudes about the farmers' market than higher income counterparts. Lower income participants enjoyed the farmers' market atmosphere better and felt more comfortable using their CalFresh benefits at the market compared to higher income participants. Participants highly valued the availability of fruits and vegetables at farmers' markets and

noted that a greater variety would be desirable.

Farmers' markets should consider recruiting more farmers in order to provide more variety of products to participants. Further research is needed to develop strategies for making farmers' markets more accessible to consumers with diverse backgrounds.

Anthropogenic effects on foliar fungal endophyte communities

Nayellie Barragan-Mejia

Foliar fungal endophytes are fungi that live inside the leaves of healthy plants. These fungi are defined as nonpathogenic since collected leaves do not show symptoms or signs of disease. Similar to the human microbiome, some fungal endophytes have been shown to be important constituents of plant health playing significant roles in plant biochemistry, physiology, and defense. Since these fungi are recruited from the local environment and are susceptible to local environmental conditions, it is likely that areas with more anthropogenic activity will negatively impact fungal community composition compared to areas with little anthropogenic activity. To test this, we will collect leaves of co-occurring trees throughout the growing season along the Big Chico Creek representing an anthropogenic disturbance gradient from the Big Chico Creek Ecological Reserve (lowest disturbance), through Upper Bidwell Park (moderate disturbance), and down to the Chico State campus (highest disturbance). We will use both culture-dependent and independent techniques to characterize the fungal communities from leaf samples collected at each location from July through December to determine how disturbance influences these fungal communities. Additionally, fungal isolates obtained from culture-inde-

pendent techniques will be used to determine how various isolates interact with each other and ultimately influence fungal community composition. Interaction experiments can provide information on how fungal communities are assembled and provide insights on how to ensure restoration efforts incorporate the use of beneficial fungi.

Monitoring the Presence of Chytridiomycosis in Amphibians by Quantitative Real-Time Polymerase Chain Reaction

Meredith Berdeja

The emerging disease, Chytridiomycosis, has been known to impact the decline of amphibian populations around the world greatly. The skin disease is caused by water-borne spores of the Chytrid fungus *Batrachochytrium dendrobatidis* (Bd). Amphibians affected with the disease show intense skin sloughing and often perish. The area of study is the Big Chico Creek Ecological Reserve (BCCER) in Butte County. Sampling will occur within these 7,835 acres of land, and 4.5 miles of Big Chico Creek, where numerous tributaries, springs, and riparian areas can be found. Although the fungus has not yet been detected in BCCER, it is important to establish early monitoring and protocols to prevent its introduction. This fungus infects several types of amphibians found through BCCER, including the Sierra newt (*Taricha sierrae*), Rough-skinned newt (*Taricha granulosa*), and Foothill Yellow-legged frog (*Rana boylei*), a California species of special concern due to its decimating numbers once infected. Another species that is crucial to our research is the Invasive North American bullfrog (*Lithobates catesbeianus*), as it is a carrier of the fungus but is not affected by sickness.

Quantitative PCR (qPCR) will be used in this research to amplify the Chytrid 5.8S ribosomal RNA (rRNA) gene to detect the presence of the Chytrid fungus. The DNA for the qPCR will be acquired by taking sterile

cotton swabs and rubbing the top skin of the amphibians. Amphibians will be caught from particular sites and released once they have been swabbed. The samples will be returned to the lab and processed for DNA extraction and qPCR. As a control, the cytochrome b gene will be used to detect the presence of amphibian DNA. The relative amount of Chytrid DNA to amphibian DNA will be compared. Results will be shared with staff at BCCER to help with conservational efforts and management of the local amphibian species and overall watershed health.

‘The Cult of Domesticity’ in Gilded-Age California

Renee Brown

The “Cult of Domesticity” as an idea began to appear in the early nineteenth century to help lay out the role of American women. This ideal highlighted their role in the home and laid out expectations for righteous behavior around the ideal of “True Womanhood.” Historians like Glenna Matthews have addressed the ideal woman. Her book, *Just a Housewife*, stresses the ways that contemporary literature and other forms of propaganda elevated this framework to women and men across the United States. Barbara Welter is another historian who wrote the article “The Cult of True Womanhood: 1820-1860,” which highlights the actual core values of the ideal that would be used to judge a woman as she became a wife and a mother. Those core values were piety, purity, submissiveness, and domesticity. However, when beginning this research, it became clear that most historical research focuses on white women from the more established East Coast cities. This research looks more directly at women from California, looking into the question of whether these cultural norms that were prevalent on the East Coast would be the same elsewhere. This is critical because while the “Cult of Domesticity” was a real ideal pushed onto women during the 1800s, should

still have the full story of women. That means understanding if women across the country were given the same propaganda and if they went along with it or broke away. The project’s research finds at least 276 divorce cases filed by women, correspondence about activities outside the home, and other life materials from the California State Library’s archives that address the ways that some women—both white women and women of color—in California rebelled against prevalent gender norms and instead did engage in philanthropic activity. This research uses Annie Bidwell, Phoebe Hurst, Jane Stanford, and Mary Ellen Pleasant as case studies to demonstrate that women in California extended their lives far from inside that home and the domestic sphere. This project argues that women in California were given the ideal of “True Womanhood” and went against the ideal since they were in California during the late 1800s. California was a new state during the late 1800s, this was unlike the East Coast which had been established for more than over 100 years. Finally, it demonstrates the significance of moving outside traditional narratives that highlight the experiences of white women on the East Coast as a substitute for all women and stresses the compelling opportunities for studying women throughout American history who pushed back cultural norms during times when the landscape around them was uneasy.

Searching for Asbestiform Minerals in Little and Middle Butte Creek

Julianna Groteguth

Little and Middle Butte Creeks flow through Paradise and Magalia whose bedrock geology is made up of metamorphosed volcanic rock and serpentinized rock. Serpentine is a mineral that is known to grow in asbestiform habit, which is a needle-like shape with a length to width ratio of 3:1. Minerals that are formed in asbestiform habit can be weath-

ered into microscopic particles which are called asbestos. Due to asbestos’ microscopic size and needle-like shape, it is known to be harmful when ingested or inhaled by humans and animals alike. What is less proclaimed to the public is that metamorphosed volcanic rocks can also contain asbestiform amphibole minerals. Since the Paradise and Magalia area is largely made up of these rocks, there is potential for these minerals to be weathered, transported and airborne by the creeks. For this project, three 1-liter samples were collected from five spots along Little and Middle Butte Creeks in search of asbestos being transported in the water. The three sample types were pre-rain, muddied, and post-rain water. The water was then filtered with 10-micrometer filters to remove the debris collected that would not be in asbestiform habit and then 1-micrometer filters to gather minerals in asbestiform habit. The 1-micrometer filters were then dried out and mounted onto a Scanning Electron Microscope (SEM) stub to be analyzed in search of asbestos fibers. The third set of samples were not analyzed due to lack of time, but all the samples that were analyzed contained asbestos fibers of different compositions. The majority of the asbestiform minerals found in the samples were non-regulated amphibole asbestos, but there were also serpentine asbestiform minerals found in the samples as well. This project shows weathering of asbestiform minerals by water systems and how further studies on the impacts of waterborne asbestos is crucial to human and animal health.

Optimizing Deep Learning Tool for Segmentation of Hyperspectral FTIR Imaging Data and Developing a Clustering Tool for FTIR Data using Machine Learning Techniques

Josh Huskisson

This research applied supervised and unsupervised machine learning (ML) techniques

to classify materials such as polymers and plastics by utilizing their Fourier Transform Infrared (FTIR) spectroscopy data. FTIR data are challenging datasets that reveal the functional groups of materials and, therefore, their constituents. Machine Learning is the field that finds patterns in data to analyze and learn from it in a faster manner than a human does. By using Neural Networks (NN) as an ML model, we were able to identify the pixels of the FTIR imaging data that contained PHB in the PHB/PLA mixture. ML techniques were used in prior research for classification of FTIR data. This research identified several ML techniques that can improve and facilitate FTIR spectroscopic data analysis by evaluating the effect of hyperparameters on the precision of the classification and comparing the effectiveness of different techniques. The NN model was optimized for the best precision and accuracy. To achieve this goal, the hyperparameters were adjusted. This produced a precision of 89% and recall of 88% with detecting the pixels that contained PHB polymer. There was an overall accuracy of 96%. The Principal Component Analysis (PCA) was implemented. The first principals confirmed the functional groups of the PHB/PLA sample. Additionally, we evaluated the effectiveness of Classification by Random Forest Classifier technique on the same data which produced similar results to the NN technique. This classifier used the preprocessed data by PCA for the training and testing steps. The precision was 92%, the recall was 88%, and the overall accuracy was 96% with detecting the material.

In a dataset of 255 microplastic types, after baseline subtraction, K-Means Clustering, as an unsupervised technique, was used to identify and group the samples through their spectral data into 'clusters' of similar data. Data was determined as similar if absorption peaks were found at the same wavenumbers. The number of clusters was determined by

computing the Sum of the Squared Error and using the elbow method. This technique can be utilized for clustering microplastic samples for applications such as finding the sources of water contamination by microplastics.

Aging and Skeletal Muscle Oxygen Utilization

Avery Lambrite, Sabrina Salvatore, Kyle Zelenski, and Ryan Perkins

Cardiovascular and skeletal muscle function are tightly interrelated due to their interface at the tissue level. Together, these systems form a complex oxygen transport and utilization cascade to facilitate energy production needed to perform aerobic work. Multiple recent reports have identified age-related alterations in muscle oxygen utilization that shed insight into the reduced exercise capacity classically observed with advancing age. Therefore, the purpose of this review is to synthesize and provide an update on the current state of the literature regarding the effects of aging on muscle oxygen utilization and underlying processes. Scientific literature will be sourced via databases archiving peer-reviewed work (e.g., PubMed, Google Scholar, etc.). Common themes and agreements amongst reports will be discussed when appropriate. In addition, clear gaps in knowledge will be highlighted as potential future work. Special attention will be given to publications addressing systems regulating oxygen delivery, extraction, and utilization in humans. Furthermore, the role of reactive oxygen species (ROS) as a regulatory mechanism of each these oxygen-related processes will be highlighted throughout. Non-invasive measurement of skeletal muscle oxygen saturation (SmO₂) are used to assess local muscle oxygen utilization and have most recently been obtained via near-infrared resonance spectroscopy (NIRS). At rest, aging individuals (>65 yr.) exhibit ~38% lower SmO₂ compared to their younger counter-

parts (<30 yr.). Additionally, aging results in reduced SmO₂ during submaximal exercise. At maximal aerobic exercise, aging leads to a reduction in SmO₂ of up to 59%. Post-exercise SmO₂ has been shown to exceed double the amount of time to return to baseline levels in older individuals compared to young. Impaired oxygen utilization has been attributed to many of the individual hallmarks of aging, including lower muscle mass, reduced oxygen carrying capacity of hemoglobin, decreased capillarization, reduced blood flow, dysfunctional endothelium, mitochondrial dysfunction, and blunted nitric oxide production. Each of these critical steps in the oxygen cascade appear to be regulated by ROS as a byproduct of energy metabolism. Composition of these recent findings may prompt additional therapeutic interventions which may attenuate health consequences associated with aging.

Metal bioaccumulation in benthic macroinvertebrates from watersheds affected by the 2018 Camp Fire

Maurice Ledoyen, Daniel Pickard, and Sandrine Matiassek

Wildfire disturbances may be highly detrimental to adjacent aquatic systems as the mobilization of nutrients, metals, and polycyclic aromatic hydrocarbons pose significant risks to aquatic biota. Metals are of particular biological concern due to their carcinogenic potential, persistence in the environment, and potential for bioaccumulation. The 2018 Camp Fire in northern California was the deadliest and most destructive fire in California history. The quantity and spatial density of structures burned presented an opportunity to study the fate of metals mobilized after this unique wildland-urban interface fire. Benthic samples from burned watersheds were collected in 2019, 2020, and 2021 by the Aquatic Bioassessment Laboratory. Three watersheds were selected for

this study as there were a significant number of structures burned in each catchment and documented declines in bioassessment indices. A fourth sample site from an unburned watershed was selected as a control. The objectives of this study were to; (1) quantify metal concentrations in benthic macroinvertebrates, comparing those from burned sample sites to the unburned control site, and (2) assess the variability of bioaccumulated metal concentrations over three years. Macroinvertebrate concentrations of chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), nickel (Ni), and zinc (Zn) were significantly higher in the burned watersheds ($p < 0.05$) compared to the unburned control. Of the burned watersheds, Clear Creek (Co, Cr, Cu, Pb, Zn, $p < 0.05$) and Dry Creek (Co, Cr, Cu, Pb, $p < 0.05$) metal concentrations were the most elevated, with Butte Creek macroinvertebrates metal concentrations most similar to those of the unburned Big Chico Creek control. Elevated, yet non-linear temporal variability was observed and likely affected by the proportion of watershed burned above the sampling location, the spatial density and type of structures burned, as well as the land use surrounding the watershed. This study highlighted the immediate and lasting bioaccumulation of metals following a wildland-urban interface fire, posing potential health impacts for aquatic ecosystems. However, more research is needed to examine the magnitude and duration of metal bioaccumulation following destructive fires.

Psychological Benefits of Permaculture: Well-Being and Connectedness to Nature

Kimberlee Michl

It has been suggested that humans are experiencing a disconnection to nature (Curtin, 2014; Kahn et al., 2013). This disconnection underlies environmentally destructive actions that have created unprecedented changes in the biosphere. This devastation

must change as the health of the biosphere is directly linked to the well-being of its inhabitants, including humans (Aronson et al., 2016; Chatalos, 2018; Summers, 2018). Participation in agroecological systems, such as community gardening, has shown evidence of being beneficial for individuals and the environment (Suto et al., 2021). Permaculture is an agroecological system that has yet to be investigated. The purpose of this research study was to investigate the connection between practicing permaculture and participants' well-being, satisfaction with life, connectedness to nature, and inclusion of nature in self. This study compared two groups of participants; those who indicated having a permaculture practice and those who did not. In total there were 109 participants, 37 of which indicated currently practicing permaculture, while the other 72 did not. Participants voluntarily participated in an online survey distributed through various platforms. Well-being was assessed using two scales: the Hedonic Well-Being Scale, also referred to as Satisfaction of Life Scale (Ryff, 1989) and the Eudaimonic Well-Being Scale, also known as the Psychological Well-Being Scale (Pritchard et al., 2019). Connectedness to nature was also assessed using two scales: the Connectedness to Nature Scale (Mayer & Frantz, 2004) and the Inclusion of Nature in Self Scale (Kleespies et al., 2021). There were statistically significant differences in each of the constructs. Those who practice permaculture indicated greater: Well-Being $t(107) = 2.54, p = .013$, Satisfaction with Life $t(106) = 2.27, p = .025$, Connectedness to Nature $t(104) = 5.29, p = .000$, and Inclusion of Nature in Self $t(107) = 5.63, p = .000$. Overall, participants who practiced permaculture scored significantly higher in each of the scales compared to those who did not. The findings of this study offer empirical evidence to suggest there are psychological benefits of permaculture and expands our understanding of the benefits

individuals can derive from participation in agroecological systems.

Understanding Barriers to Usage of Basic Needs Programs at Chico State

Dania M. Moreno Ruiz

This qualitative focus group project is the second phase of a mixed methods research project to better understand the barriers to accessing the Basic Needs Program resources at Chico State, such as The Hungry Wildcat Pantry, Emergency Grants, and Housing Assistance. In the first phase of the study, which started in January 2020, part of the research team surveyed 430 students who are low-income and do not currently utilize basic needs resources on the barriers they have faced using basic needs resources on Campus. To gain a deeper understanding of these obstacles in phase two of the study, the rest of the research team conducted eight focus groups between April 2022 and June 2022 with 22 students who had filled out the survey (1-6 participants in each group). Focus groups were auto transcribed using Otter.ai and then reviewed for accuracy by the student members of the research team. The focus group research team is currently coding the focus group transcripts using Dedoose qualitative software. Some preliminary findings suggest that the Basic Needs Program needs to better advertise its services to Chico State students to end the stigma of who is worthy of accessing these services and add resources not yet available that equally benefit students commuting to Chico State and distance learners. Once the data analysis is complete, the research team will combine the findings of the study's first phase with the second phase into a report for the Basic Needs Project.

The report aims to summarize barriers students face in accessing basic needs resources, share resources that students stated facilitate their access to resources that promote food and housing insecurity, and

offer suggestions on expanding access to the Basic Needs Program. Such findings can help increase graduation rates and positively affect the well-being and retention of students.

Optical characteristics of dissolved organic matter in streams affected by wildland-urban interface burning

Brooke Rosenow, Jackson P. Webster, and Sandrine Matiasek

Wildfire frequency, severity, and size have increased over the past few decades in the western United States. Increased fire frequency and growing urban development in the wildland-urban interface (WUI) raise concerns about water resources and quality. To better understand the impacts of burned anthropogenic materials in the WUI, this study observed the sources, dynamics, and fate of dissolved organic matter (DOM) in surface waters affected by the 2018 Camp Fire in Paradise, California. During the wet 2019 water year following the fire, water samples were collected from creeks draining watersheds affected by the Camp Fire during each major storm event to capture fire-generated DOM mobilized by stormwater runoff. Ash samples were collected in summer 2019 from burned structures and automobile tires. The objective of the study is to characterize the optical properties of combusted organic molecules transported in water after a WUI fire. This study asks the following question: Does DOM derived from specific burned sources of a WUI fire have distinguishable absorbance properties? Preliminary leaching experiments were conducted with three types of ash: white, black, and tire to establish their optical characteristics. Specific ultraviolet absorbance (SUVA) was used to estimate the DOM aromatic content in WUI fire-affected waterways, and the spectral slope ratio of 275-295 nm and 350-400 nm was calculated to approximate DOM molecular weight as an indicator for DOM source and transformation. Preliminary tests indicated that SUVA₂₅₄

values in leached ash DOM (0.65-1.66 L mg⁻¹ m⁻¹) were low compared to creek DOM (2.59-8.00 L mg⁻¹ m⁻¹), while the spectral slope ratio was relatively higher in leached ash DOM (0.86-1.65) when compared to creek DOM (0.81-1.05). SUVA₂₅₄ is positively correlated to DOM aromatic content while the spectral slope ratio is inversely related to the molecular weight of DOM, suggesting that ash materials have a generally lower DOM aromaticity and molecular weight when compared to drainages most affected by urban burning. Ultimately, this study will provide a new understanding of the type of pollutants mobilized in waterways after WUI burning, with implications on aquatic ecosystems and public health.

Bioswale Plant Metal Accumulation and Seasonal Variability

Adil Syed, Gabrielle Wyatt, and Sandrine Matiasek

Urban surfaces contain many pollutants, such as grease, oil, pesticides, and trace metals from vehicles, construction, and industrial activities, which can be transported by urban stormwater runoff. Vegetated bioswales are known to increase the infiltration of these waters into the subsurface, as well as remove heavy metals through sorption, microbial decomposition, and phytoremediation. Trace metals are particularly concerning for flora and fauna within these bioswales, potentially resulting [SM1] in loss of biodiversity and soil degradation. This study investigates the mobility of metals within plant tissues, as well as the seasonal variability of metal uptake in plants at the Butte College bioswale in Oroville, California. Three native species were sampled in March 2020, *Muhlenbergia rigens*, *Juncus patens*, and *Carex barbarae*, and metal concentrations were analyzed within root and shoot tissues. These results were compared with data from the same plant individuals sampled in October 2018, May 2019, and October 2019. Higher concentra-

tions of trace metals were measured within root tissues compared to shoot tissues, with a 7.2-fold difference over the two years. Additionally, there was an increase in the overall bioaccumulation of metals over the two wet seasons analyzed (November-March), with an average 5.1-fold increase in the first year, and a 2.7-fold increase in the second. The 2019 dry season (April-October) resulted in an overall 54% decrease in trace metals in both root and shoot tissues. Between the five metals analyzed, those that are naturally part of the plant physiology (e.g., zinc) appeared to be the most mobile within plant tissues after uptake: the translocation factor (root:shoot ratio) for zinc was 1.67 in October 2020, while the chromium translocation factor was 0.14. Vegetated bioswales are an effective method for decreasing the impact of urbanization on water quality. However, given the harmful effects accumulating trace metals in vegetation can have on the surrounding ecosystem, these results have implications on the design and maintenance of these systems.

Tuscan Formation: Volcaniclastic Debris Flow Deposits from Ancient Mt. Yana: Using the MYana Explorer App to Communicate Geologic History to the Public

Erica Thompson, Henry Marine, Andrew Harp, and Rachel Teasdale

The Tuscan Formation is a series of volcaniclastic deposits consisting of breccia, conglomerate, sandstone, and mudstone beds emplaced by debris flows from Mt. Yana. Located 40 km south of the Lassen Volcanic Center, Mt. Yana is an eroded 3 Ma stratovolcano of the ancient Cascades (Clynne et al., 2010). Tuscan Formation deposits are in contact with and derived from Mt. Yana lavas (Clynne and Muffler, 2017). Geochemical and textural correlations of pyroxene-phyric andesites that are present in Mt. Yana lavas and Tuscan Formation clasts (Lindberg

et al., 2006 Cortino et al., 2007) are used to correlate source lavas with debris flow deposits. MYana Explorer, a newly developed educational app-based guide for the public, presents observations and geologic analyses that explain relationships between the Tuscan Formation and eroded Mt. Yana. MYana Explorer includes 12 different stops exploring the geology of the Tuscan Formation and Mt. Yana (in Chico CA and within a 2-hour drive from Chico, respectively). Three stops explore the Tuscan Formation and focus on the concept of geologic time. In two locations, users observe the base of the Tuscan Formation, which is a nonconformity where debris flows were deposited on the Lovejoy Basalt Formation (15-16 Ma; Coe et al., 2005) and on Carboniferous metabasement (Clynne et al., 2010). This expression of geologic time is important to geologists and is a valuable educational opportunity to explain natural history to the public. MYana Explorer app users will learn how Mt. Yana was built through dike emplacement and eruptions of lava, how it eroded to a now nearly unrecognizable volcano, and how this resulted in the emplacement of the Tuscan Formation. The app will help users understand their local geology including, volcanic erosional processes, volcaniclastic deposits, geologic time, and the geology of proximal and distal volcanic facies associated with eroded stratovolcanoes in the Cascade Range. The MYana Explorer app will be available free online in the spring of 2022.

Uruguay as a Destination for Migration

Victoria Villaseñor

This study was created to investigate the political history of Uruguay and its modern-day implications, specifically within the context of migration. This study involved the collection of qualitative data through interviews with people from Cuba, Brazil, and Venezuela, who had recently migrated to Uruguay.

The participants shared about their firsthand experiences and offered insight into migration in Uruguay. The participants discussed the reasons why they felt compelled to leave their country of origin, what specifically drew them to Uruguay, and how their experience has been so far. While their personal experiences and background vary greatly, some of the commonalities include praise for Uruguay's simple migration process (especially for people who come from countries that are part of the Mercosur agreement), the country's economic stability, high quality of life, laid back culture, LGBTQ+ inclusion on a political and social level, as well as free public universities and universal healthcare. A Uruguayan professor was also interviewed to create space for them to share their perspective on how the recent influx of migrants has impacted their country and Uruguay's politics and sociocultural norms. The Uruguayan perspective on migration was also explored through the information presented in Montevideo's *Museo de las Migraciones* (Migrations Museum). In addition to the theme of migration, this intersectional study focuses on Uruguay's history as a welfare state, feminism in Uruguay, the implications of the country's colonial past, and its reputation as being LGBTQ+ friendly. The results of the oral history interviews challenge some of the stereotypes and assumptions US citizens may have toward Latin American countries. The study also highlights ways in which we could look to Uruguay as an example of migration policies that are more humane than the system we have in place in the United States.

Evaluating the Best Instrument for Geochemical Analysis of Tonalite from the Bald Rock Pluton Near Oroville, CA

Matthew Wagoner, Elisabeth Kennedy, and Hannah Aird

Accuracy versus convenience is an important decision when choosing a geochemical

analysis method. Two instruments may serve similar purposes in their analytical output but cater to different needs depending on the level of accuracy needed. An inductively coupled plasma mass spectrometer (ICP-MS) is regarded as the best way to run trace element analysis in geological materials, but preparation takes longer as samples must be digested in acid before being ionized with a plasma torch and run through a detector that measures mass and concentration. While also intended to analyze the bulk composition of a sample, the portable x-ray fluorescence spectrometer (pXRF) is portable and handheld making it optimal for field use. An x-ray is emitted at a specific wavelength hitting the sample, causing a secondary x-ray to be emitted characteristic to each element with the concentration of each element calculated from the intensity. The pXRF is more time efficient, taking only minutes to obtain data, and is a non-invasive, low environmental footprint option, but has significantly higher detection limits than the ICP-MS, with ICP-MS detecting elements in the parts per trillion, and a pXRF detecting on the parts per million scale. A tonalite sample taken from the Bald Rock Pluton was run through both instruments and sent to an outside research-grade XRF analysis laboratory. Magnesium and chromium are accurate for both ICP-MS and pXRF, showing a percent difference of less than 5% when compared to data from the outside facility. The ICP-MS was more accurate for nickel, 7% compared to 15% for the pXRF, and the pXRF was more accurate for aluminum, silicon, and iron. If the wanted results are in low concentrations or are trace elements besides aluminum, the ICP-MS is more precise with results having low relative standard deviations. If the intent is major element oxides, then the pXRF is the better choice, since it can process both silicon and iron which the on-campus ICP-MS currently cannot accurately measure due to the lack of an available standard for Si and signal inter-

ference for Fe. Both instruments are good options if expected concentrations are taken into consideration.

Future Temporal Perspective and Acculturation as Predictors of Eating Behavior, Exercise, and Body Image Among Latinx Undergraduates

Maria Zepeda

Temporal Perspective is a concept that helps in understanding the psychological theories of time, including the individual's importance of the past present, and future. Future time perspective includes a person's view of the limitations regarding their future and the opportunities they have. A key feature of the positive time perspective, which is a more optimistic and motivated point of view of the opportunities they can face in the future, is the assumption that the person's time is extended. On the other hand, a negative time perspective is a pessimistic view of what the future holds for their health, academic, and personal lives, as well as the time frame they have left. This research study was designed to understand Latinx undergraduates' perspective of their future, and how acculturation to western culture affects their eating habits, exercise, and body image. The research included understanding the perspective of the future, people's timing and order of future events and goals, their behavior with regard to culture, acculturation, multiculturalism, and its relationship with the dominant American culture. Additionally, eating, exercise frequency, and body image issues in psychology were looked into as was the time perspective of White Americans. The results were that people with positive future time perspectives were physically healthier with a higher likelihood of healthy eating, exercise more, and higher body self-esteem. However, there are no studies that involve the behavior of the individual or that investigate differ-

ent cultures and how culture affects them. Acculturation does correlate with unhealthy choices due to increasing body dissatisfaction, leading to unhealthy eating habits and infrequent exercising. It is recommended that future researchers attempt to understand the correlation between future time perspective and acculturations, as there is overall a lack of research regarding the two connections.

Perseverance to a Point: "Does Grit Interfere with Help-Seeking in First Generation College Students"

Sara Isabel Zuniga

The psychological construct of grit has generated significant enthusiasm for its predictive-ness of achievement of long-term academic goals. Despite grit being viewed almost exclusively as a positive trait, there may arise situations in which being too "gritty" is suboptimal and likely to interfere with more efficient behaviors such as help-seeking. One group within higher education that may be vulnerable to interference from grit is first-generation college students (FGCS), who tend to exhibit high levels of grit and perseverance (O'Neil et al., 2016) compared to non-first-generation college students (NFGCS; Midkiff, Langer, Demetriou, & Panter, 2016). Compared to NFGCS, FGCS may feel obligated to persist in challenging situations and avoid asking for help for fear of burdening others or being judged (Chang et al., 2020). If grit is more likely to interfere with help-seeking in FGCS than NFGCS, then institutions may wish to allocate resources to train FGCS to identify when and how to ask for help from support staff. With this background, the present experiment examined whether FGCS ($n = 21$), when compared to NFGCS ($n = 21$), would (1) score higher on grit (Short Grit Scale; Duckworth & Quinn, 2009), (2) score lower on help-seeking (Karabenick, 2003), and (3) persist for longer in a novel unsolvable spot-the-difference task before asking

for help. Surprisingly, FGCS and NFGCS did not differ significantly on any questionnaire-based (grit, help-seeking) or behavioral measures (time spent searching or asking for help in the unsolvable spot-the-difference task). Our results should be viewed in light of limitations such as our small and homogenous sample, as well as the online medium through which sessions were conducted. Additional research is needed to characterize the predictive validity of measures of grit in academic settings. If grit, and specifically perseverance, allows researchers to identify students who are vulnerable to suboptimal academic behaviors, then interventions can be implemented as they prepare to transition to their higher education institution. To this end, future researchers may wish to develop educationally relevant tasks requiring perseverance to clarify whether excessive grit is associated with negative consequences for college students who encounter challenging academic situations.

GRADUATE STUDENT ABSTRACTS

Social Isolation Impacts Depression, Anxiety, and Drug Vulnerability in Adolescent Mice

Gelsey Aldana

Social isolation due to the COVID-19 pandemic has precipitated many stress-related mental illnesses, particularly in adolescents. Social isolation can lead to increased levels of depression and anxiety, as well as increase the risk of substance abuse. It is important to explore how this particularly relevant stressor can affect adolescent brain development. The purpose of this study is to examine whether mice that undergo a prolonged period of isolation during adolescence demonstrate differences in depression- and anxiety-like behaviors and cocaine sensitization. To examine the effects of social isolation, mice were utilized. When mice are weaned, they are isolated for 21 days. After the 21 days of isolation, the mice utilized in this study underwent a series of behavioral tests. Through these tests, depression-like behaviors were assessed in the forced swim test, anxiety-like behaviors were examined in the elevated plus maze and open field test, social preference was examined in a social interaction test, and cocaine sensitization was examined through a conditioned place preference. Preliminary data demonstrated that socially housed mice showed decreased depression- and anxiety-like behaviors when compared to isolated mice suggesting that social support has a stress-reducing effect. The results of this study will allow for further understanding of the effect of adolescent social isolation and its effect on depression- and anxiety-like behaviors, as well as their vulnerability to cocaine.

A Comparison of Two Stable Isotope Sampling Methods for Dentinal Collagen

Erin Boyle

Archaeological studies into early childhood diet and weaning patterns have been conducted for decades. Stable isotope analysis of dentin, a tissue found within teeth, allows researchers to view chemical signatures in the growth layers of teeth to infer changes in diet over time. These results then indicate important information about past societies such as their environments, subsistence strategies, labor structures, and ideologies. However, the strength of these archaeological interpretations rely directly on the reliability of methodology. Dentin microsectioning is a technique of taking very small samples from teeth for precise stable isotopic analysis. Whole teeth are first demineralized in acid before being portioned into smaller microsections. These microsections are then individually treated with slightly acidic water to extract the collagen, which can then be measured for ratios of stable carbon and nitrogen isotopes. The earliest form of this technique involved slicing the dentin into approximately twelve horizontal strips. Later work recommended a different approach: removing much smaller cores of dentin using a biopsy punch, sometimes more than twenty per tooth. This later method was suggested to provide finer-resolution data despite being more labor-intensive and more subject to chemical contamination. Subsequent authors often take as fact that the latter method is superior, but only one previous work has compared the two methods empirically. Using human permanent first molars from a pre-European-contact Ohlone site, this study seeks to test whether the two methods produce statistically different results by performing both methods on

the same teeth. To date, samples have been prepared and are being analyzed at an external lab. The resultant data, expected by early 2023, are anticipated to show slight but not statistically significant differences between the two methods. Future researchers can use these results to weigh the benefits and drawbacks of each method. These results will also provide insight to Californian prehistory as they will be illustrated through a case study on dietary strategies and cultural change within a pre-European-contact Ohlone society.

Access to Care: Exploring the Use of Telehealth Services During the COVID-19 Pandemic

Janessa Brierton

Telehealth services in the United States boomed during the COVID-19 pandemic and have continued to transform the healthcare landscape. Prior to COVID-19, telehealth services were typically constrained by strict requirements that had to be met for insurance reimbursements. This paper presents a novel empirical study that utilizes data from the Centers of Disease Control and Prevention (CDC) via the National Center for Health Statistics. In particular, this study explores demand for telehealth services in the US during the pandemic. This research empirically shows that older individuals have sought virtual medical appointments at a greater rate to minimize the risk of contracting the virus. It also shows that those living in metropolitan areas have utilized telehealth visits more frequently, which is likely a function of greater access to healthcare resources. Finally, this study shows that certain chronic conditions, such as diabetes mellitus, lead to such patients utilizing telehealth services at a higher rate given their increased susceptibility to the virus.

De Eso No Se Habla: How Latinx Communities Communicate About Sex (Education)

Samantha Di Lelio Boice

This study was designed to better understand how sex is communicated within Latinx and Hispanic communities. A review of literature revealed that sex and sex education are considered to be highly taboo topics that are seldom talked about within Latinx and Hispanic communities. Researchers have identified tradition, beliefs, and attitudes as variables that influence whether sex education/communication occurs. Previous studies on this topic have shown that Latinos in the United States are disproportionately affected by HIV and sexually transmitted infections, accounting for about 24 % of newly diagnosed AIDS cases each year. They are also two to three times more likely to develop STIs when compared with non-Latino whites. The largest contributing factor to these outcomes is limited knowledge of STIs. Despite these known challenges specific to Latinx and Hispanic individuals, few studies have incorporated the voices and experiences of Latinx and Hispanic individuals in this body of literature. To address this gap, one-on-one interviews will be conducted with Latinx/Hispanic individuals aged 18 and up to inquire about their first-person accounts of their first exposures to family communication about sex/sex education. The results of this study are expected to include a common experience in which participants report they did not receive “proper” education about sex-related issues through family communication alone. This study brings to light an issue that addresses the importance of sex education and how the lack of it among Latinx and Hispanic adolescents can lead to early initiation of sexual intercourse, which previous research suggests can come with potentially unknown

risks, such as unplanned pregnancy and sexually transmitted infection.

Potential Occurrence of Naturally Occurring Asbestos in the Paradise, CA Area

Elisabeth Kennedy

Naturally occurring asbestos (NOA) refers to six regulated minerals in the serpentine and amphibole mineral groups that occur in a natural geologic setting. NOA minerals are resistant to heat and corrosion and have high tensile strength with long and slender mineral forms, typically with a 3:1 micron aspect ratio. As a recognized public health hazard due to the carcinogenic effects when inhaled or consumed, the mapped distribution of NOA is important to protect the public and workers from severe lung disease. The basement rocks underlying southern Magalia and northern Paradise are a series of interbedded serpentinites (metamorphosed ultramafic rock) and metavolcanic rocks. The serpentinites are currently mapped by the California Geological Survey as potential NOA sources, while the metavolcanics are not. Using a combination of geologic maps and known asbestos source maps, sixteen hand-samples were collected from sites identified in the field as serpentinitized ultramafic rocks or metamorphosed mafic metavolcanic rocks. Petrography, scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDS) and X-ray diffraction (XRD) analysis of metavolcanic and serpentinitized ultramafic rocks show the occurrence of asbestiform amphibole minerals and chrysotile veins, which is the asbestiform variety of the serpentine group minerals. Results have confirmed the presence of chrysotile fibers in the serpentinite, and analysis of the metavolcanics show they contain

unregulated asbestiform amphibole minerals, which have been shown to pose the same health hazards as regulated asbestos amphiboles. The findings of this study may result in local and statewide reclassification of potential NOA sources. This informs the best practices for dust mitigation during construction activities and opportunity for public education on asbestos hazards.

The Behavioral Ecology of Food Insecurity in Young Adults

Emily V. Mansilla

Behavioral ecology predicts that resource availability influences individuals' tendencies toward risk-taking. Specifically, individuals in resource-rich environments are predicted to show risk aversion, whereas individuals in resource-lean environments are predicted to show risk proneness. By extension, food insecurity (i.e., a resource-lean condition) could exacerbate risk-taking behavior, especially among already vulnerable populations such as young adults. Food insecurity (FI) is a common problem among college students in particular, with ten colleges in California reporting FI among 40% of students. Common interventions include food pantries and nutritional/cooking courses; however, physical and psychological barriers such as inconvenient hours of operation and stigma associated with FI limit their accessibility (Zein et al., 2018). The proposed research project is aimed at enhancing the accessibility of an effective FI intervention (i.e., food pantry availability) through a month-long food delivery program. A pre-post design is proposed to identify improvements in risk-taking behaviors prior to and following enrollment in the food delivery program. In particular, 20-30 participants reporting FI without food pantry exposure would receive scheduled food deliveries over the course of 30 days and complete

probability discounting tasks to assess potential shifts in risk-taking tendencies resulting from reduced FI. Ultimately, the goal of the project is to evaluate the proposed intervention's impact on risk sensitivity through a behavioral ecologic lens. Should greater access to food not only decrease self-reported FI but also risk-taking behaviors, food pantry delivery programs may prove valuable in preventing negative outcomes associated with FI in young adults. Adoption of food delivery programs by institutions of higher education may therefore confer significant improvements in quality of life and learning upon their attendees who experience chronic FI.

The Effects of Peer Mentorship on the Outcomes of SLP Graduate Student

Ashlley Martinez-Aguilar

Individuals from diverse backgrounds and first-generation students embarking on a career in Speech-Language Pathology (SLP) may find themselves isolated and academically disadvantaged compared to their peers. According to ASHA's 2021 demographic data report, only 8.7 percent of SLPs identify as underrepresented groups (ASHA 2022). To increase diversity, Stewart & Gonzalez (2002) discussed that universities must implement plans to attract diverse CSD students. The CMSD graduate program is rigorous and challenging and has yet to adopt a formal peer mentoring system, which may be one strategy to increase diversity. A mentorship program may increase student confidence in their ability to succeed academically and as future SLPs. This study investigated the effects of peer mentorship on the self-efficacy of CMSD graduate students. Self-efficacy is a person's belief in their ability to succeed. Students with higher self-efficacy ratings are more confident in their ability to control motivation, behavior, and environment. The study paired a second-year graduate student

with a first-year graduate student focusing on specific topics throughout the semester. The design of the mentorship program is adapted from Cole and Wright-Harp Multiple Mentor Model (2008), which uses multiple mentors to support and facilitate graduate students' progress in both academic and professional careers.

The peer mentor program followed Cole and Wright-Harp's model as a central theme for each meeting, yet conversational topics were open. Peer meetings were 30-60 minutes and scheduled in three-week intervals, followed by no meetings in the fourth week. The student rated their self-efficacy with a 5-point Likert scale every fourth week and was tracked across time. The mentor program lasted for one academic semester.

The results demonstrated that four of five students benefited from the mentor program and improved their self-efficacy in their first semester of graduate school; one student maintained self-efficacy scores (no change). More research is needed on the qualities of excellent mentorship programs, the long-term effects of being mentored during grad school, and how mentorship impacts outcomes (especially for underrepresented students). Overall, peer mentoring for first year graduate students may be an effective way to mitigate stress and improve sense of belonging for all.

How are the Children of Mexican Immigrants Building Resiliency in Pursuit of a Four-Year Degree?

Leticia Mejia

Obtaining a college degree is an achievement to be acknowledged, yet the journey to pursuing and completing such an accomplishment can be challenging and demanding. It is often hardships that bring the best out of individuals. The educational lived experiences of the research authors were the motivation for developing this study, examining the impor-

tance of how resiliency contributes to the academic success of children of Mexican immigrants. Unfortunately, there is limited research on how resilience can impact the success of children of immigrants seeking higher education. More research is needed to understand how resiliency contributes to the success of children of Mexican immigrants in achieving a 4-year college degree. This cross-sectional, qualitative research study is designed to examine how children of Mexican immigrants build resiliency in pursuit of a four-year college degree. The study seeks to understand why some children of Mexican immigrants chose to obtain a four-year college degree. The study further explores what resiliency factors, tools, and resources have contributed to the educational attainment among this target population. A total of twelve semi-structured, in-depth interviews were conducted to understand the resiliency and academic success of children of Mexican immigrants. The preliminary data analysis indicates that educational experiences, familianismo, and parents' sacrifice have heavily impacted the resiliency and success of children of Mexican immigrants who have attained a four-year college degree. This current study is imperative to enhance knowledge in identifying resiliency factors to support children of Mexican immigrants to further their educational success. Through this study, the researchers hope to contribute to the social work field by building upon the existing research on academic and social support for children of Mexican immigrants in the United States.

Binge-eating Alters Anxiety-Like Behaviors in Adolescent Female Mice

Parnaz Rezaie Boroon

Despite the increase in adolescents suffering from binge eating disorder, the consequences of this phenomenon are still widely unexplored in scientific research. Furthermore,

females are more likely to develop binge-eating disorder than males. As adolescent brains are not fully developed, commonly observed behaviors such as problematic eating may play a harmful role in the way their brain properly processes reward. This is especially important considering such alterations can render the adolescent brain more vulnerable to anxiety and depression-like behaviors. This study uses a novel model of binge-like eating behavior in adolescent mice to identify the ramifications of binge-eating disorder. Female adolescent C57BL/6J mice were exposed to standard chow or high-fat diet (HFD) for 2-h a day, three days a week (PND 39-64), for four weeks. Twenty-four hours later, cocaine reward was assessed. We also examined anxiety-like behavior using elevated plus maze (EPM), and depression-like behavior using the forced swim test (FST) and splash test. Animals exposed to HFD demonstrated greater food consumption, indicative of binge eating, during the four-week intermittent cycle compared to the standard chow group. During EPM, the HFD group spent more time in the open arms compared to mice given standard chow which highlights increased impulsive behaviors for us to examine in the future. While HFD mice were slightly less immobile in FST compared to standard chow mice, HFD mice also groomed themselves noticeably less than standard chow mice during the splash test, suggesting an increase in depression-like behavior due to their display of behavioral despair. Lastly, only the standard chow group developed preference for the compartment paired with cocaine. Our research findings suggest that binge eating in adolescence may contribute to increased anxiety- and depression-like behaviors. Therefore, binge eating disorder may exacerbate anxiety and depressive symptoms in vulnerable teenagers. Future studies should explore the neural mechanisms underlying these behaviors to better understand the

direct effect of binge eating on the adolescent brain.

Being Black/African American in a Predominately White Workforce: Challenges, Barriers, and Lessons Learned

Dominique Silva Soares

To date, there remain no peer-reviewed journal articles on the challenges and barriers of Black/African American human services professionals in White rural workforces. This cross-sectional qualitative study aimed to bring awareness to the challenges Black/African American human services professionals experience in the rural, predominantly White workforce. The research identified the challenges, barriers, and lessons learned from Black/African American professionals.

Purposive and snowball sampling methods were utilized to recruit seven participants who identified as Black human services professionals in a rural White community. All participants completed informed consents, a demographic questionnaire, and an open-ended interview with the principal investigator. Thematic analysis was used to identify significant themes. Results revealed that Black human services professionals in a predominately White rural community are code-switching to mitigate stereotypes and "fit in" with their White colleagues. They are viewed as the token race whenever their agency notices them; Black professionals are often asked to represent diversity and are walking on "eggshells," adapting to the comfort levels of their colleagues.

Barriers included constantly questioning of one's worth and value to the agency, an expectation to perform with perfection, the inability to feel a sense of belonging, and a lack of spaces where race can be safely discussed. Every participant reported the most important lesson learned by being a Black profes-

sional serving a rural, predominantly White community was finding support and building your community.

The sense of belonging and support is the driving force of human service work. The implication of this research study is applicable across various systems and practices as it highlights how employers are stressing the importance of community to assist clients, but are not implementing the community characteristics and its practice or policy in the office. The emotional taxation of adhering to job requirements and the pressure to perform every day among your clients and colleagues has a drastic effect on the body mentally, physically, and emotionally. As indicated in this research, Black/African American human services workers serving predominantly White rural communities experience more challenges and barriers in being their authentic selves as they encounter systematic obstacles to establishing their professional careers.

Investigating co-localization of histone H3 and mitochondria in Arabidopsis thaliana root cells

Sophia Thao

Histone H3 is a protein responsible for chromatin formation and gene regulation in eukaryotes. DNA strands condense into chromosomes by wrapping around a core of 8 histone proteins. Histone H3 is formed in the cytoplasm of the cell and is then imported into the nucleus. However, current research has concluded that histone H3 may also bind to the outer membrane of the mitochondria and potentially lead to programmed cell death (PCD). The previous studies required a process that requires the cell to be broken down in order to study binding activity. Therefore, the purpose of this research is to visualize histone H3 and the mitochondria in vivo by cross breeding two plants

with different fluorescent markers, one for histones and the other for mitochondria. We hypothesize that histone H3 will co-localize with the mitochondria in living cells, and that fluorescent microscopy can be used as a novel approach to determine binding activity. The pollen grains of flowers with red fluorescent histones were introduced to the isolated stigmata of flowers with yellow fluorescent mitochondria. Hybrid seeds have been collected and are currently in early stages of development. We will photograph the cells of parents and offspring to determine the location of histone H3 and the mitochondria. After layering images of the same cell with different colored filters, we predict that the fluorescence of histone H3 will overlap with the fluorescent mitochondria, indicating co-localization. The results of the project will provide more insight into histone H3 function and structure, specifically in relation to mitochondrial DNA (mtDNA) formation. Mitochondria have their own set of DNA and a histone protein bound to the mitochondria would suggest that mitochondria contains histone-like structures in the mtDNA. Future experiments could focus on the downstream effects of histone H3 binding to the mitochondria and the potential effects on human and animal cells that undergo PCD.

Do students learn best when using hands-on artifacts?

*Stephen Torres, Rachel Teasdale,
Kelsey Bitting, Katherine Ryker*

This study focuses on using hands-on artifacts in laboratory activities increased students' conceptual understandings in science. Hands-on artifacts can apply to different subjects as well, but for the purpose of this study, we looked at undergraduate introductory geology courses. We conducted a study in which 11 teaching assistants (TAs) were asked questions about teaching and learning in introductory geoscience courses using the

Teaching Beliefs Inventory (1). One of the questions asked is, "How do your students learn science best?"; 61% of TAs interviewed believed hands-on learning helped their students learn science. We examined TA responses to define "hands-on" as physically interacting with an artifact, such as a rock or mineral. Using the TA definitions for hands-on, we compare learning in two introductory lab activities: plate tectonics (not hands-on) and minerals (hands-on), both of which were used in a face-to-face format. Based on fall 2021 pre- and post-course content survey responses, students had an average learning gain of 28% for plate tectonics and 50% for minerals. This comparison is consistent with improved learning in labs where students physically handle artifacts (hands-on). Learning gains are higher when students use artifacts to assist their learning, as evident in the learning gains for minerals labs with artifacts/face-to-face versus minerals labs with no artifacts/online. Another factor that contributes to higher learning gains is interest. Students were more interested in all forms of minerals labs (face-to-face and online) than in plate tectonics labs. All mineral labs have higher learning gains than plate tectonics labs. When we compared our face-to-face mineral labs learning gain data compared to face-to-face plate tectonics labs learning gain data, the results showed that hands-on manipulatives in labs increases student learning more than just student interest. This research is important because it can increase student engagement and motivation to learn and enhances different factors, such as perception, creativity, and logic. Science can be a challenging subject, so we are trying to find ways in which students can learn science better and have more fun. (1) Luft & Roehrig, 2007.

Regulation of Manganese Oxidation in *Pseudomonas putida* GB-1 by Two-Component Regulatory Pathways

John Vang

Manganese-oxidizing bacteria (MOB) and the manganese (Mn) oxide minerals they produce are being investigated for their uses in bioremediation which is the use of organisms, often microorganisms, to degrade and breakdown environmental pollutants. For example, MOB can be used to degrade painkillers found in wastewater that if left untreated can contaminate river systems, harming fish and people. *Pseudomonas putida* GB-1 is a well-characterized MOB that can be genetically manipulated, making it a useful model organism for the study of Mn oxidation. This study will focus on the regulation of Mn oxidation by a putative two-component regulatory (TCR) pathway called the Mnx TCR. A TCR pathway includes a sensor kinase (SK) and a response regulator (RR) that regulate gene expression in response to an environmental signal. In many cases, overexpression of a RR can suppress the loss of its cognate SK. The Mnx TCR pathway is predicted to include two SKs (MnxS1, MnxS2) and a RR (MnxR) because all three genes are essential for Mn oxidation, and the three genes are located together on the chromosome. Alternatively, the 2 SKs may each work with a separate RR to control Mn oxidation. Overexpression of the RR MnxR suppresses the oxidation defect of the *mnxS2* deletion strain. However, overexpression of MnxR did not suppress the loss of the MnxS1 sensor kinase. Additionally, the three genes are not found together on the chromosome in other Mn-oxidizing pseudomonads. Given these observations, we propose that MnxS1 works with a RR other than MnxR. The *P. putida* GB-1 genome is predicted to have 35 RR genes. Two candidate RR genes (PputGB1_2453, PputGB1_2469) were selected based on their

location near other Mn oxidation genes, lack of adjacent SK genes, and conservation in Mn-oxidizing but not non-oxidizing pseudomonads. Both RRs will be over-expressed in the $\Delta mnxS1$ strain. If either one suppresses the loss of MnxS1, this will support the hypothesis that MnxS1 works with this RR instead of MnxR. This work will improve our understanding of the regulation of Mn oxidation in *P. putida* GB-1 and will help optimize production of Mn oxidizes that will increase productivity in bioremediation.

Instructors Positionality: Facilitating Racial Discussion in the Classroom

Nhoua Xiong

The COVID-19 pandemic and racial violence in the summer of 2020 illuminated the invisibility of violence imposed on Black, Indigenous, People of Color (BIPOC) communities through decades of racist policies making it permissible and normative. In a system such as higher education, conceived to support and value white supremacy (dominant culture perspective, custom, and knowledge), instructors play a fundamental role in reproducing and reinforcing white hegemony. An exploratory quantitative research design with qualitative interviews was used to understand instructor awareness of positionality in relation to attitudes about their level of skills and knowledge facilitating discussions about race in the classroom. Such an approach aided in developing a base understanding of how instructors rate their confidence and understanding as well as exploring broader contexts of exposure to and experience with race. The quantitative data gathered included demographics and measured how instructors rate their comfortability, skills, and knowledge of facilitating discussions on race. The qualitative data was designed to be open ended, which allowed for a more in-depth understanding of the nuances of self-awareness of positionality and how this impacts

skills in facilitating discussions on race in the classroom. The results of this study indicated that most instructors are aware of their positionality and are comfortable with their perceived knowledge and skills to facilitate the conversation of race in the classroom. When splitting instructors into two groups, BIPOC and white, a striking pattern emerges from the data. White instructors consistently score higher than BIPOC instructors across three surveys. In contrast, the varied range of scores from BIPOC instructors may suggest BIPOC instructors are less likely to be influenced by social desirability response bias, or they understand the complexities of race in articulation with institution and culture, thus requiring future interrogation. In a profession where students are becoming more racially diverse, social work needs a broad adaptation from other disciplines. Different frameworks are necessary to ensure meaningful conversations around race are discussed in the classroom and prepare students to work in a racially diverse society.

Intergenerational Family Conflict in the Hmong Community

Pa Yang

The purpose of this study was to explore the relationship between acculturation, family functioning, and well-being. The Hmong community was a population of particular interest in this study. The main research question was: what are the pertinent issues that present challenges for the Hmong community? Additionally, based on past research, the study examined issues of the Hmong community related to acculturation and generation gap. In part 1, a qualitative design approach was used. This was done specifically through semi-structured interviews with Hmong Cultural Center Staff of Butte County, California. In part 2, a correlational quantitative design was used. This was done through a

Qualtrics survey. The results of part 1 showed that generation gap (e.g., language barriers and unshared cultural practices in families) is indeed a pertinent issue in the Hmong community. The results of part 2 showed that for the Hmong participants, family functioning and acculturation to American culture were significant predictors of well-being. Whereas, for the non-Hmong participants (e.g., Hispanics), family functioning and acculturation to ethnic culture were significant predictors of well-being. Overall, these findings suggest that the Hmong participants (who were mainly young adults) are highly acculturated to the American culture and that biculturalism of such communities should be researched further. Furthermore, due to this sample consisting of mainly young adults (ages 18-25), future research should gauge for acculturation levels from other age groups in order to have a better understanding of acculturation for this community as a whole.

Heavy metal concentration in non- and livestock-mortality compost

Yount, D.¹, L.K. Snell², N.O. Stevens³, G.E. Woodmansee³, and K.L. DeAtley¹

Composting is a viable disposal option for livestock-mortalities and offal; however, it is illegal in California due to the perceived risk of disease transfer and heavy metal leaching into ground water. Mortality composting is a cost-effective option for ranchers. Objectives of this study were to determine heavy metal concentration in non- and livestock-mortality compost. The 59-day trial was conducted at the Chico State composting facility where treatments included: 1) non-mortality (i.e., control), 2) whole carcass, 3) bone-in offal and 4) boneless offal compost. Carcass and offal materials were bovine, porcine, and ovine. Carbon, nitrogen, and stock materials were similarly sourced. Control compost was produced using dairy manure and bedding

materials in the windrow method while carcass and offal treatments were produced using the mounding method. Decomposition occurred from day 1 to 43 followed by the pathogen reduction period (i.e., day 44 to 59) where temperatures were maintained at or above 55°C. A completely randomized design was used with analysis of variance and Tukey mean separation tests. Results indicate no difference ($P > 0.05$) among treatments for arsenic, cadmium, chromium, lead, molybdenum, and selenium. Copper ($P = 0.07$) and mercury ($P = 0.07$) tended to be different among treatments. Nickel concentration differed ($P = 0.01$) between boneless (61.07 ± 1.23 ppm) and control compost (56.13 ± 1.64 ppm; $P < 0.05$). Zinc concentration differed ($P = 0.04$) for bone-in offal and was lower (133.10 ± 5.85 ppm) compared to whole

carcass (177.23 ± 16.10 ppm) or control (174.13 ± 5.57 ppm; $P < 0.05$). Results suggest minimal heavy metal accumulation in non- and livestock-mortality compost and indicate that composting livestock carcasses and offal products can produce a product similar to conventional compost. Results contribute to a growing body of knowledge that could help justify livestock-mortality composting being implemented in California.

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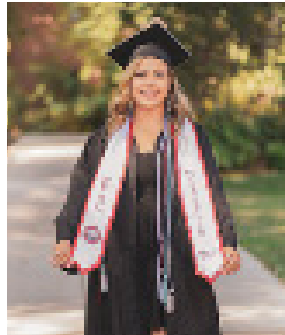
Key words: Carcass, compost, heavy metal, livestock mortality

Table 1. Heavy metal concentration (ppm) mean \pm SEM of non-mortality, whole carcass, bone-in offal and boneless offal compost.

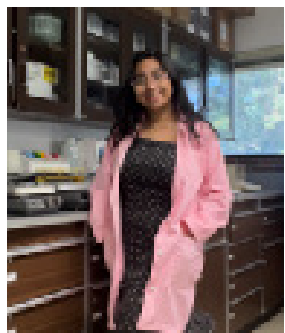
Item	Min/Max, mg/kg	Conventional	Whole Carcass	Bone-in Offal	Boneless Offal	$P > F$
Arsenic	0.25	1.34 \pm 0.61	0.90 \pm 0.25	1.67 \pm 0.14	2.06 \pm 0.23	0.2033
Cadmium	0.03	0.12 \pm 0.03	0.05 \pm 0.01	0.07 \pm 0.01	0.05 \pm 0.02	0.1854
Chromium	0.1	166.33 \pm 1.64	171.23 \pm 17.93	170.00 \pm 18.22	149.10 \pm 10.23	0.7114
Copper	0.1	56.10 \pm 1.82	50.53 \pm 3.29	45.90 \pm 1.76	50.57 \pm 1.67	0.0703
Lead	0.5	2.73 \pm 0.19	2.00 \pm 0.10	2.40 \pm 0.15	2.37 \pm 0.27	0.1253
Mercury	0.05	0.02 \pm 0.02	0.07 \pm 0.02	0.03 \pm 0.02	0.00 \pm 0.00	0.0790
Molybdenum	0.1	2.90 \pm 0.29	2.30 \pm 0.47	1.83 \pm 0.23	2.03 \pm 0.37	0.2398
Nickel	0.1	56.13 \pm 1.64	56.57 \pm 0.03	60.53 \pm 0.23	61.07 \pm 1.23	0.0169
Selenium	0.5	1.13 \pm 0.03	1.20 \pm 0.10	1.03 \pm 0.03	1.10 \pm 0.06	0.3574
Zinc	0.05	174.13 \pm 5.57	177.23 \pm 16.10	133.10 \pm 5.85	149.47 \pm 9.68	0.0461

About Our Student Authors

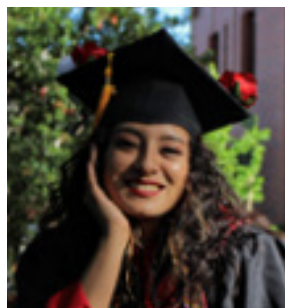
Undergraduate Students



Jovita Avila earned her bachelor's degree in nutrition and food science with a double option in nutrition communications and dietetics from Chico State in May 2022. She continues her education journey at Chico State by completing the dietetic internship program to become a registered dietitian. She's passionate about helping others by improving their relationship with food. She aspires to work in a clinical setting and hopes being a bilingual, compassionate, and a caring person will positively impact the lives of others. As a first-generation college graduate, she also plans on pursuing a master's degree and a specialty in the clinical field.



Nayellie Barragan-Mejia is an undergraduate majoring in microbiology with a focus on clinical laboratory science and a minor in biochemistry. She is a first-generation Mexican American from Van Nuys. Her biggest academic goal is to receive a PhD in the science field. Nayellie is interested in many science fields including mycology, pathology, genetics, and more! Nayellie hopes to be an inspiring role model and share her passion with younger generations to encourage the STEM field. You can find Nayellie in her science lab with her stylish pink coat!



Meredith Cassandra Berdeja earned her bachelor's degree from Chico State in December of 2022. Her degree was in evolutionary, ecological and organismal biology, along with a minor in sustainability. She hopes to further her education by obtaining a master's degree in ecological sciences. Meredith's love for nature and the environment comes from her family's appreciation of the outdoors. She strives to encourage younger generations to go out and explore the flora and fauna around them. She loves sharing her passion for wildlife through animal fun facts.



Renée Brown is a Chico State alumna. During her academic career at Chico State, she was treasurer of the History Club, an ambassador to the College of Humanities and Fine Arts, and a member of Alpha Gamma Delta. She plans to either continue her education through a graduate program or find work in a museum.



Josh Huskisson is a senior pursuing a major in Computer Engineering and a minor in computer science. His work focuses on the application of deep learning in identifying purities of materials. He plans to work on software out in the industry post college and utilize the project management skills learned during this research project.



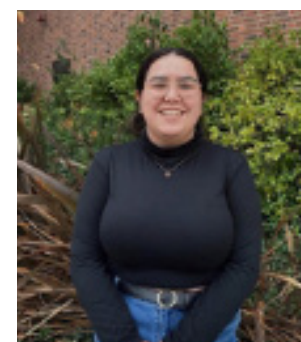
Dania Mabel Moreno Ruiz is a senior triple majoring in Spanish, international Chicanx/Latinx studies, and Latin American studies. She will continue at Chico State, pursuing her studies in the bilingual authorization multiple-subject program. Her areas of interest include indigenous communities in the Western Caribbean Zone of Nicaragua, modern Latin American politics, and the effects of colonialism in Hispanic/Latine communities. Mabel's goal is to become a multiple subject professor at California State University, Northridge.



Juliana Palmas Vera is a senior double majoring in pre-credential Spanish and Latin American studies. She will continue at Chico State, pursuing her studies in the bilingual authorization single-subject program. Her areas of interest include indigenous communities along the Yucatan Peninsula, the effects of globalization in indigenous communities, and modern Latin American politics. Juliana's goal is to become a Spanish high school teacher to work with and support emergent bilinguals of all socioeconomic and language backgrounds.



Victoria Villaseñor is a senior double majoring in history and multicultural and gender studies. After graduating in May 2023, she aspires to earn a master's degree in History from Chico State and earn a PhD to become a professor in the future. Her experiences studying abroad in Montevideo, Uruguay, and La Habana, Cuba have inspired her to seek other opportunities to live and perhaps teach or conduct research abroad. Her primary research interests include race, gender, and sexuality in US and Latin American history.



Maria Zepeda is an undergraduate student who is expected to graduate from Chico State in May 2023 with a degree in psychology and multicultural and gender studies with a minor in intersectional Latinx studies. As a queer, first-generation person of color, they are very passionate about social justice and activism for everyone, including the LGBTQ+ community. They are the president of Chico State Pride and an involvement coordinator with Student Life and Leadership at Chico State. They were also the 2022 recipient of the Louis-Goldblatt Award for Social Change.

About Our Student Authors

Graduate Students



Alondra Adame is a graduate of the master of Arts in English program at Chico State. They are a Chicana essayist and poet. Their research interests include creative writing of all genres, but they have specific interests in creative nonfiction, poetry, and hybrid work that strives to break and toy with genre conventions. Their hope is to continue studying the craft of the various forms in creative nonfiction and someday write a craft book of their own.



Gelsey Aldana earned a master's degree in psychological science in May 2023. She will continue her education at Loma Linda University, where she is pursuing a doctorate in clinical psychology. After graduating, she aspires to become a clinical psychologist and work with underrepresented populations.



Erin Boyle is in the final year of her master's program in anthropology with a biological emphasis. Prior to her time at Chico State, Erin graduated with a bachelor's degree in evolutionary anthropology from UC Davis. Her interests include bioarchaeology, stable isotope analysis, and the anthropology of early childhood. After graduation she hopes to become an instructor of anthropology at a community college.



Samantha Di Lelio Boice earned her bachelor's degree and is pursuing her master's degree in communication studies at Chico State. Her research focuses on health communication and critical cultural studies. As a first-generation Latinx student, Samantha and her work advocates for underrepresented/marginalized groups/students to create and maintain equity in higher education.



Emily V. Mansilla is a first-year graduate student studying psychological science at Chico State. She is dedicated to researching the impact of adversity on addiction outcomes and various mental health implications through a behavioral lens. Her goals are to teach and support students studying psychology in her hometown of Chico. She also plans to utilize her research skills by working in data analytics for companies that align with her interests. Emily is motivated by her past experiences with poverty and her Central American family history. Family is important to Emily, and she works hard to spend time with her family on her off time.



Ashley (Ash) Martinez Aguilar is a graduate student in the communication sciences and disorders program. She is pursuing her goal to become a speech-language pathologist and will graduate in May 2023. Ash is passionate about serving underrepresented individuals and aspires to research the gaps in serving multicultural individuals and their needs. She advocates and empowers individuals because she believes everyone deserves a voice.



Leticia Mejia earning a master's degree in social work at Chico State University. After graduating from Chico State in 2024, she plans to work toward the licensure process and her PhD. Her areas of interest include the Hispanic/Latinx community, trauma-informed practice, adverse childhood experiences, and rural communities. Letty aspires to be a clinical social worker supporting trauma survivors, specifically in the Latinx community.



Parnaz Rezaie Boroon is a master's student studying psychological science at Chico State. After graduation, she plans on gaining additional research experience as a research assistant in a neuroscience lab. Through her personal battle with a binge-eating disorder, her biggest obstacle ultimately became a passionate research interest for her. After a seven year academic break and gaining employment as a social worker for Butte County's Children's Services Division, Parnaz's goal is to become a neuroscience professor who infuses a passion for science within her students of all backgrounds.



Dominique Silva Soares returned to Chico State to earn a master's degree in social work in 2022. Dominique's research on the lived experiences of Black/African Americans in predominantly White workforces is a testament to the passion she has always had for diversity and inclusion. She plans on continuing her research at a doctoral level and hopes that it will encourage others to be mindful of the importance of inclusivity not only in their workspaces, but in their communities as well.



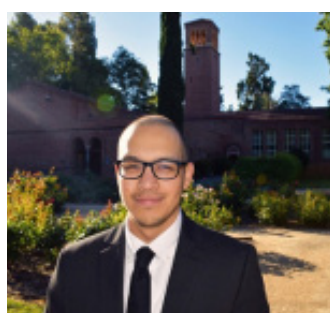
Sophia Thao is a graduate student in the Biological Sciences Department. She hopes to finish her thesis soon and graduate next semester. Her area of focus is on cellular and molecular biology, specifically the intracellular activities of proteins in eukaryotic cells. Sophia's goal is to work for a biotech company and hopefully continue her work in microscopy. She also enjoys teaching at the college level and sees a future in that as well. She loves movies, TikTok, and nightlife. She has two cats named Pimp and Blinky.



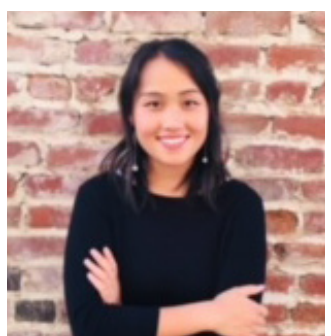
Stephen Torres is a graduate student in the computational literacy across secondary settings (CLASS) program at Chico State. He is earning a master’s degree in teaching and a single-subject teaching credential in science. He will graduate in May 2023. His areas of interest include geoscience and trying to find ways to make science more fun and engaging for his students. His goal is to become a high school science teacher and inspire future generations of students to pursue careers that make them happy, just as teaching makes him happy.



John Vang is a graduate student at Chico State. He is in the biology program studying regulation of manganese oxidation in bacteria. His goal is to be a university professor.



Juan Vega Ramirez earned a master’s degree in history from Chico State in May 2021. His Mexican-American upbringing inspired him to study the various ways Mexican culture and history intersects with that of the United States. He aspires to enroll in a doctoral program in the near future where he hopes to continue exploring the seemingly endless connections between Mexico and its northern neighbor. Juan’s goal is to gain a better understanding of the Mexican American experience so that he can educate others and create positive change in his community.



Pa Yang is earning her master’s degree in psychological science from Chico State. She hopes to gain more experience in her field through community work and teaching. Her interests include supporting students and individuals positively in both their academic and wellness journey. Her goal one day is to be an educator at the college level and help students toward success.



Dana Yount is a Graduate student at Chico State earning her master’s degree in interdisciplinary studies: regenerative agriculture. She will be walking this coming May 2023, and completing her program Fall 2023. Dana works as an environmental scientist for the California Department of Food and Agriculture as part of the Methane Reduction Team and will continue her work after graduation. Her work aligns well with her research for her master’s program and she hopes to continue with future work and research on livestock mortality composting.

Meet Our Faculty Mentors



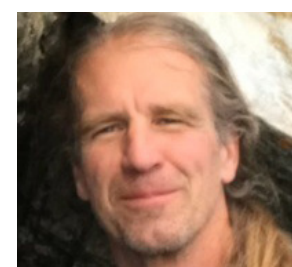
Professor Zahrasadat Alavi is an assistant professor in the Electrical and Computer Engineering Department at Chico State. She has been the principal investigator on several grants such as National Science Foundation Major Research Instrumentation funding for the acquisition of an FTIR Spectroscopic Imaging System, Student Success Grant, and grants for Chico State Research, Scholarship, and Creative Activity. She is also a co-principal investigator on another NSF-MRI grant and an Office of Naval Research Grant. She is the director of Alavi FTIR Spectroscopic Imaging Lab (AFISIL) and supervises multiple undergraduate students in their research. Her research interests include characterization of biological samples by employing FTIR Spectroscopic Imaging techniques and developing novel digital image processing and analysis algorithms to process the collected FTIR-spectro-microscopic data.



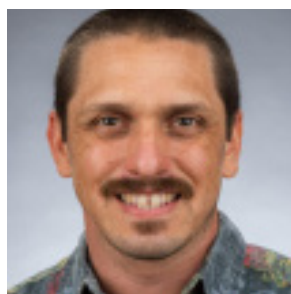
Professor Eric Bartelink is a professor of physical anthropology and serves as the director of the Chico State Human Identification Laboratory (CSUC-HIL), the Stable Isotope Preparation Laboratory (SIPL), and as the co-coordinator of the Certificate in Forensic Identification. He teaches undergraduate and graduate-level coursework in introductory physical anthropology, human osteology, forensic anthropology, bioarchaeology, human growth and development, and statistics. He is a certified instructor for POST (Peace Officer Standards and Training), and teaches short courses and workshops in forensic anthropology, forensic archaeology, and human versus nonhuman bone identification. His interests in forensic anthropology relate to the use of stable isotope analysis for the identification of unknown individuals, taphonomy (e.g., remains, animal scavenging, and fluvial transport), and trauma analysis.



Professor Shawn Bates is an associate professor of psychology and neuroscience at Chico State. His interests include higher learning and research that could potentially benefit individuals suffering from addiction, behavioral neuroscience, adolescence, social environment, stress, and psychopharmacology. Currently, he is using in vivo electrophysiology to examine how stress affects cognition in males and females. His long-term research goals involve exploring long-lasting effects of psychoactive drugs in adolescence, including recreational substances like opioids and psychostimulants, but also those with more clinical relevance, such as ketamine and ADHD drugs like methylphenidate.



Professor Kristopher “Kris” Blee is a professor of biological sciences at Chico State where he teaches undergraduate coursework in biology. His field of study is plant cell biology. His research interests are aimed at plant defense, plant-microbe interactions, symplastic continuity, and cell wall development.



Professor Gerald Manuel Cobián is an assistant professor of biological sciences at Chico State. He is a microbial ecologist interested in plant-fungal interactions. His research interests include plant fungal interactions, biogeography, phylogenetics, and community assembly. His past research has mainly focused on foliar fungal endophytes (fungi that live inside the leaves of plants) and the biogeography of their interactions in an attempt to describe how changing environments influence plant-fungal interactions and explain the assembly processes of fungal communities.



Professor Kasey DeAtley is an associate professor of agriculture at Chico State. DeAtley also co-advises the Young Cattlemen’s Association. Her field of study is animal and range science. Her research and professional interests include beef cattle production, rangeland science and management, reproductive physiology, ruminant nutrition, supplementation of byproducts, genetics, and genomics. She has researched livestock mortality composting, the utility of supplementing brewers grains to cattle, and increasing the capacity of rangeland research and education in collaboration with multiple institutions.



Professor Andrés García-Penagos is an assistant professor of psychology at Chico State. His field of study is experimental psychology and experimental analysis of human behavior. His research interests include the experimental analysis of human behavior, including particularly the issues of behavioral rigidity and behavioral flexibility, decision-making, choice, and symbolic behavior, particularly in social situations, both in the lab and in naturalistic settings. He also has an interest in social cognition and social coordination and action. He is also fond of conceptual/philosophical work. He has supervised research into the influence of temporal perspective and acculturation as predictors of eating behaviors, exercising, and bodily image among LatinX undergraduate students.



Professor Claudia Sofía Garriga-López is an assistant professor of intersectional Chicanx/Latinx studies as well as queer and trans Latinx studies in the Multicultural and Gender Studies Department at Chico State. She has a PhD in American studies from the Department of Social and Cultural Analysis of New York University. She is currently serving as a postdoctoral associate in the Extreme Events Institute in the Office of Research and Economic Development at Florida International University, where she is part of a research and instructional team for the “Race, Risk, and Resilience: Building a Local-to-Global Commons for Justice” program funded through the Andrew W. Mellon Foundation. Her scholarly work is grounded in a critical engagement with activism, public policy, and public health, as well as trans, feminist, and queer performance art and cultural production in Latin America, the Caribbean, and within people of color communities in the United States.



Professor Kati Geszvain is an assistant professor of biological sciences at Chico State. Her field of study focuses on bacterial genetics, bacterial physiology, and environmental microbiology. Her work focuses on bacteria that convert reduced, soluble manganese to insoluble Mn minerals. This microbial activity affects the global geochemical cycling of carbon and metals and can be used for bioremediation applications. She uses genetic tools to understand how and why bacteria oxidize manganese. Her research interests include bacterial physiology and metal transformations by environmental bacteria.



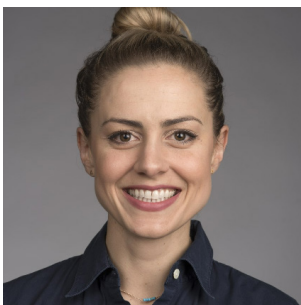
Professor Keiko Goto is originally from Japan. She was born in Gunma Prefecture, which is famous for hot springs and tough women. She holds a bachelor’s degree in food science and technology from Kyoto University and a PhD in nutritional sciences from Cornell University. As a nutritionist, Goto has worked in various countries such as Guatemala, Indonesia, Jamaica, the Philippines, and Tanzania, and has developed a deep appreciation of diversity in people and food. Her current research interests include food and culture, international nutrition, and food behaviors.



Professor Patrick S. Johnson is an associate professor in the Psychology Department at Chico State. Prior to arriving in Chico in 2015, he earned a bachelor’s degree in psychology from the University of Florida, an master’s degree in applied behavioral science from the University of Kansas, and a PhD in psychology from Utah State University. He served as a postdoctoral fellow in the Department of Psychiatry at the Johns Hopkins University School of Medicine. Johnson’s training and research has focused on the areas of behavioral economics, behavior analysis, psychopharmacology, and addiction. He works closely with his undergraduate and graduate research assistants to apply behavioral economic models to a variety of public health issues, including substance abuse, sexual risk behavior, and distracted driving.



Professor David Keller is a professor in the Biological Sciences Department at Chico State. His field of study is genetics and his past research includes the genetics of type 2 diabetes, specifically pancreatic beta cell biology and the molecular and cellular mechanisms of type 2 diabetes. His lab studies gene expression and signal transduction pathways in pancreatic beta cells. In particular, they are interested in mechanisms of tissue-specific gene expression and currently study the regulation of microRNA genes.



Professor Jennifer A. Malkowski is an associate professor of communication arts and sciences at Chico State. Her research and teaching lie at the intersections of public health communication, medical professionalism, and biotechnological controversy where she explores how persuasive communication influences perceptions of and responses to health risks at both the individual and collective levels. Her work has appeared in *Health Communication*, *Journal of Medical Humanities*, *The Review of Communication*, and *Journal of International & Intercultural Communication*, in addition to other edited collections. Her recent work includes a co-edited special issue of *Rhetoric of Health & Medicine* that inaugurates a research trajectory for scholars invested in the public nature of health specifically.



Professor Kenyan L. Martin is a clinic director and assistant professor of communication arts and sciences at Chico State. Her field of study is speech-language pathology and her past research includes communication enhancement approaches for patients with traumatic brain injury and stroke as well as teaching and learning methods in communication sciences and disorders. Her current interests include single subject experimental design, adult language and cognitive communication disorders, clinical supervision, and interprofessional practice.



Professor Gabby Medina Falzone a.k.a. Dr. Gee is a queer, multi-ethnic boricua, and an assistant professor of African American studies and Latinx studies. She is an interdisciplinary critical youth studies scholar, drawing from fields such as social epidemiology, critical psychology, and critical criminology. Her work is greatly influenced by Fanonian sociogeny and both Patterson and Cacho's theories of social death. Her past research examined the criminalization, dehumanization, and disregard of Black and Latinx adolescents in schools, communities, and juvenile detention and the social and psychological consequences of that treatment.



Professor Rachel Teasdale teaches for the honors program as well as the Earth Environmental Sciences Department at Chico State. Her field of study is earth sciences, specifically volcanology and geoscience education Research. Her research in volcanology involves investigating how lava flows cool and crystallize as they flow across the Earth's surface. Teasdale's research also includes projects in Northern California, including in the Lassen region and in learning about ancient Mt. Yana. Her geoscience education research focuses on ways students learn best in the sciences, including active learning and inquiry-based lab activities.



Professor Robert Tinkler is a professor and department chair of the History Department at Chico State. He has been with Chico State for 21 years. His field of study is 19th-century US history. His research specializes in the history of the early American Republic, the American Civil War and Reconstruction era, and the American South. His past research has focused on antebellum and American Civil War-era politics.



Professor Martin van den Berg is an associate professor and department chair of the Psychology Department at Chico State. He is interested in cognitive psychology, the scientific study of mental processes. Most of his research has been on visual perception, specifically the processes by which the visual system takes in sensory information and organizes it into whole objects that can be recognized. He also has an interest in attention and working memory. By doing research in cognitive psychology, he has come to appreciate the ability to answer various questions by developing an appropriate methodology. He has recently worked with students on various topics, exploring the benefits of different research methods.



Professor Judy Vang was raised in Oroville and received her bachelor's and master's degrees from Chico State's School of Social Work, and her doctoral degree from Portland State University Graduate School of Social Work. Vang's research interests include mental health, juvenile delinquency, refugee/immigrants, HIV/AIDS, and the educational experiences of students of color. Her past research has included suicide among Hmong Youth, Hmong parents' understanding of the juvenile justice system, HIV, social work education.



Professor Alisa Wade is an assistant professor of history at Chico State and a historian of early America, with a focus on the intersections of the history of gender and capitalism in the eighteenth century. Her research focuses on the intersections of gender history and capitalism in the eighteenth century. Previous projects have analyzed the economic experiences of widows, patterns of women's investing, and the gendered implications of class consolidation in the revolutionary era and early republic.



APPENDICES

Appendix A

Research & Writing Resource List

Campus Writing & Research Resources

- [Writing Tips – Graduate Studies – Chico State](#)
- [Activities \(Thesis/Project Guidelines\) – Graduate Studies – Chico State](#)
- [Writing Center – Student Learning Center – Chico State](#)
- [Subject Librarians | Meriam Library | Chico State](#)
- [Research Subject Guides | Meriam Library | Chico State](#)
- [ESL Support Services – The Department of English – Chico State](#)
- [BSS Student Success Center – Behavioral & Social Sciences – Chico State](#)
- [Chico State University Communicators Guide](#)

Campus Research Opportunities

- [Student-Faculty Research Collaborative](#)
- [Annual Student Research Competition](#)
- [Student Awards for Research and Creativity \(SARC\)](#)
- [Adelante Summer Researchers Program](#)
- [Chico STEM Connections Collaborative \(CSC2\) Undergrad Research Program](#)
- [California Pre-Doctoral Scholars](#)
- [Chancellor's Doctoral Incentive Program \(CDIP\)](#)
- [Funding for Graduate Research and Conferences](#)
- [Graduate Equity Fellowship Program](#)

Websites

- [Style and Grammar Guidelines \(Official APA website\)](#)
- [MLA Style Center \(Official MLA website\)](#)
- [The Online Writing Lab \(OWL\) at Purdue](#)
- [Graduate Writing Overview \(Purdue OWL\)](#)
- [How to Distinguish Between Popular and Scholarly Journals \(UC Santa Cruz\)](#)
- [Writing Tips & Tools \(University of North Carolina at Chapel Hill\)](#)
- [UW-Madison Writer's Handbook \(University of Wisconsin-Madison\)](#)
- [Handouts \(University of Illinois at Springfield\)](#)
- [Common Errors in English \(Washington State University\)](#)

Books

- *The Artful Edit: On the Practice of Editing Yourself* by Susan Bell
- *The Elements of Academic Style: Writing for the Humanities* by Eric Hayot
- *Stylish Academic Writing* by Helen Sword

Appendix B Submissions



Photo Credit: California State University, Chico

Find information on submissions and more on the Adelante website:

<https://www.csuchico.edu/adelante/researchers-program/student-research-journal.shtml>.

Please direct journal submission questions to Adelante Journal Editor at

graduatestudies@csuchico.edu.

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Facebook: [Adelante Chico State](#)

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More information is also available at the Office of Graduate Studies:

graduatestudies@csuchico.edu.