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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 1: Fall 2021

California State University Chico
Graduate Studies
ADELANTE PROGRAM

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Acknowledgements

Photo Credit: California State University, Chico

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 and the waters that run through campus.

We are humbled that our campus resides upon sacred lands that once sustained the Mechoopda people for centuries.

From the Editor Vania S. Buck

¡Saludos!

I am beyond ecstatic to finally share this amazing resource for current and future students at Chico State. Here at Adelante, we regularly discuss creative ways to engage our students in research. As first-generation students, many times we are afraid of pursuing new things out of fear of failure and because we often have no family we can turn to and ask questions. This student journal grew out of an idea to provide students interested in pursuing research or any other creative project encouragement to overcome some of those fears and a starting point to begin.

We also developed this student journal to show Chico State students that research is diverse and comes in all shapes and forms and that there is no single way to produce your research. Research is produced in all disciplines: not just sciences as we sometimes believe, but also art, social sciences, humanities, creative writing, and more. I think you will see some of that diversity of approach and style in this first edition of our journal. I hope it encourages you to be creative, explore your own potential, and see that there is space for you in academia as a student researcher and writer.

When I first found out about the opportunity to develop this student journal through Adelante, I was scared. I had never done something big like this, and I was afraid to fail. But I was curious about what it took to create a student journal. I asked questions and I connected with faculty who could guide me. I was fortunate to have amazing mentors who not only supported, taught, and guided me, but also helped me to see that my high expectations for myself also created a high fear of failure. They argued that we sometimes need to fail to learn from our mistakes. So I took a risk and said "yes" to the opportunity to create this journal. I am glad I did. Working on this first edition, I not only learned a lot about developing a student journal, but I had an experience that I will forever cherish and use to achieve my future academic goals.

With this student journal, we hope that you will be inspired to conduct your own research in whatever form you decide to do it in. I hope that students can utilize this first edition as a resource to jump start their writing journey and connect with faculty who share similar interests.

Remember, Wildcats…
¡Si Se Puede!

From the Co-Editor Alondra Adame

Adelante is so much more than a program at Chico State. It makes such a difference when everyone who works together holds a shared experience. We are all attempting to make the road we've paved behind us smoother for those who will follow. Vania and I hold a lot of similar titles as immigrant daughters, as first-generation students, and as the first people in our families to hold master's degrees. Working with her on this journal has felt like working with an extension of myself, and I've loved every minute of it.

As a first-generation student, I feel like creating opportunities to show off the incredible efforts made by aspiring scholars is what inspires future generations to pursue their research interests. I want to show students that their talents and voices are being recognized and admired by the people who worked on this journal. Additionally, I hope this will inspire future generations to look upon this inaugural journal as one of the first steps toward all the possibilities that academia can provide them.

This journal is full of work that has come from the hard work and hearts of ambitious inspiring students. This is a celebration and I hope each contributor feels pride when they look over their pages.

—Alondra Adame

From the Production Editor Natalie Lawlor

I am excited to contribute to the Adelante student research journal. Adelante is an essential program at Chico State in supporting the academic achievement of students and providing students with resources and preparation for graduate school. The student research journal is a wonderful opportunity for students to showcase their work to others here at Chico State. I believe that the facilitation of an academic journal exemplifying the research conducted by Chico State students is an amazing asset to encourage research and allow students and faculty to learn about the work of both undergraduate and graduate students.

As a graduate student, I am very familiar with the effort and time put into conducting research as a student. I feel that this journal will allow students to be acknowledged for their efforts and academic achievements in research. I hope that the influence of this journal will contribute to an academic environment that is supportive and encouraging of students pursuing research and preparing for graduate school. Because research is such a significant aspect of graduate school, this is a fantastic opportunity for students to be inspired by their peers, and to support and learn about the research currently being conducted by Chico State students!

This student journal exemplifies the hard work of the students and associated faculty here at Chico State, and I am so honored to be a contributor to the creation of this opportunity for research to be presented.

—Natalie Lawlor

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. We determined the structure and scope of this first journal. 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, we expanded the journal to include student author photos and biographies. We also thought it was important to recognize and highlight the amazing faculty who provide the opportunities and mentoring necessary to ensure our students' success. We included their photos and biographies, too. Finally, we developed and 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 first edition. We believe it does meet 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 Graduate Student 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 California State University, Chico 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 Brianda Guzman, I use they/them pronouns, and was born in Uruapan, Michoacán but raised in Yuba City, California. I am studying speech and language communications disorders at Chico State and hope to graduate and move on to a master's program out of state! My art is the way I deal with mental block and anxiety, and I don't normally share it with people. But I was motivated to share this piece because of interactions I've had with younger Latine individuals, particularly my kid sister, who don't get to see the works of Latine artists and never get the chance to relate with art on a deeper cultural level. I also feel it is important to highlight the efforts and gains made by the Latine(x) community, and one of the best ways to convey a message is through what we put out in the world. Art is powerful, and I hope my art can influence others or at least show them that they are not alone.

Art Description

"El Nopal en la Frente" [Mexican idiom, "the cactus on the forehead"] was inspired by the changing of one's identity to fit in with the outside environment and assimilate without losing one's roots. There is almost an expectation to become less of one's culture in order to fit into society, but how can you deny something that's so deeply ingrained in who you are?

Art Inspiration

El Nopal en la Frente
by Brianda Guzman

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STUDENT PAPERS

This is a student paper from a 300-level history course, "Historians and Historical Methodology" which teaches writing and research skills with a focus on historical interpretations. The author was a junior, and his faculty mentor was Professor Dallas DeForest. This historiographical paper is a critical examination of what past historians have had to say about the roles and status of women in classical Sparta. 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.

Roles of Mothers in Classical Sparta

Kevin A. Buenrostro

This paper proposes an examination of the development of women's social status in classical Sparta, particularly investigating how Sparta's unique martial social composition shaped the roles and values of women. The women of ancient Sparta achieved an unparalleled level of fame or, perhaps better put, "infamy" in the ancient world for their brazen disregard for Hellenic patriarchal conventions. Worse yet, to outside observers, male Spartans appeared perfectly content to let their women "run wild." The ancient historian Xenophon observed, "Nowhere else did the state lavish such attention on women than in Sparta."[1] While chauvinistic beliefs were not exceptional in the ancient Mediterranean, it must have seemed like the ultimate paradox to ancient Greeks to reconcile Spartan discipline and piety with laissez-faire sexual norms. Naturally, this paper borrows the same line of inquiry ancient observers adopted: why did this macho warrior society afford such liberties to women? However, when considering the Spartan state's goals and their unique economic system, the rationale behind their egalitarian practices becomes clear. This analysis will substantiate the logic underpinning Laconian law and highlight the unrivaled freedom and status Spartan women enjoyed at the zenith of their civilization.

While the history of ancient Sparta enjoys a great deal of public interest, there is little in the form of primary source accounts to distinguish historical realities and what papyrologist Sarah B. Pomeroy calls the "Spartan mirage."[2] A "mirage" is perhaps too dismissive of the military and social innovations Sparta developed, but too often, popular accounts gloss over or leave out entirely the numerous failures and shortcomings of Laconia. Moreover, while the story of the "brave 300" and similar heroic tales do lend themselves to the big screen, scrupulous history writers (amateurs included) must be honest with their audience and inform them upfront that we are working for the most part with limited resources. In this sense, Pomeroy is right to note that the task of distinguishing fact and fiction is arduous with a civilization that always preferred the sword to the pen. Indeed, the sources concerning Sparta are minimal compared to their Athenian rivals. Ancient Laconia is obscured further by the primary source writers' proclivity to write prescriptively rather than descriptively.[3] Nevertheless, historians like Pomeroy and Paul Cartledge, two leading authorities in the world of classics and ancient history, give credence to the firsthand accounts archivists have at their disposal.[4] One more final caveat concerning the evidence used in this paper is that the women and men referenced unless

[1] Sarah B. Pomeroy, *Spartan Women* (New York: Oxford University Press, 2002), vi.
[2] Ibid., Viii.
[3] Ibid., Viii.
[4] Ibid., X.

otherwise specified are Spartans of the highest civil order, that is, full-fledged citizens who completed the state-run education system (agōgē). Since little is known about Messinian and Laconian helots' (serfs) daily lives, it is impossible to infer if the customs practiced in Sparta proper extended to them.[5] However, their functions in Laconian society are well known and are essential to understanding Spartan civilization.

The Spartans immigrated from northern Greece into the lush Laconian valley sometime around 1,000 B.C.E.[6] They are descendants of the three Doric tribes Gylleia, Dymanes, and Pamphyloi. Spartans continued to revere Doric Olympian Gods, Apollo foremost among them, depicting them with weapons and armor, emblematic of Spartan concerns and values. Upon arrival, the Spartans launched a series of wars against the native inhabitants, succeeding in conquering Laconia and then Messenia. Sparta controlled the largest terrestrial territory in Classical Greece, some 8,000 square kilometers, three times more than Athens and twice the area of Syracuse, the second-largest landowner.[7] Sparta outsourced all agricultural and domestic work to the formerly free inhabitants of the land, relegating them to a hereditary and immutable state of serfdom. Cartledge argues that the Helot system is the single most consequential institution Sparta developed.[8] The Helots outnumbered Spartan citizens ten to one by some estimates. Consequently, Sparta created a military master caste forbidden from pursuing any other trade or profession other than war to maintain control over this formidable hostile labor force. Indeed, the fear of slave rebellion informed the entire Spartan political, military, social and economic structure.[9] Lycurgus, Sparta's mythical lawgiver, is credited for codifying the legal and educational system. The Lycurgan code's introduction shifted Spartan citizens' psychological makeup, injecting a novel concept of participatory citizenship and overarching communal fealty.[10] Indoctrination became a prerequisite for inclusion, so every child, boy or girl, enteredinto the agōgē at the age of seven and remained until the age of eighteen.[11]

The agōgē entailed different ultimate outcomes for each gender. It functioned as a crucible for males, often breaking the weak, while mentally and physically refining those worthy of donning Spartan crimson. Conversely, the agōgē transformed young girls into patriotic and equally resilient women responsible for providing the state with future generations of hoplites.[12] While females' physical requirements were not as unforgiving as the males', they performed similar daily training in the typical nude fashion.[13] Women trained in the javelin, discus, sprint, and horseback racing, just like their male counterparts. These Olympic events have a precise application to warfare, in which women did not engage, so it is not self-evident why women were expected to be proficient. Spartan eugenic beliefs likely held that athletic mothers produced athletic sons, but more importantly, Spartan women educated their sons and daughters during their early childhood. Therefore, mothers needed to be exemplary both in virtue and skill. The latter point is particularly relevant to Spartan society since Spartan law forbade husbands from living at home until they

[5] Ibid., X.
[6] Paul Cartledge, *The Spartans* (Woodstock, NY: Overlook Press, 2003), 28.
[7] Ibid., 26.
[8] Ibid., 28.
[9] Ibid., 71.
[10] Ibid., 56.
[11] Ibid., 29.
[12] Pomeroy, *Spartan Women,* 4.
[13] Ibid., 14.

turned thirty.[14] This unique Laconian tenet afforded women a great deal of autonomy and independence. Additionally, unlike other Poleis, Spartan girls were not rushed off to marriage at a young age but instead married after turning eighteen. While husbands lived at the barracks with their units, wives managed their families' landholdings and continued to do so even after the husband came home.[15] The division of responsibilities to the state, i.e., mother and steward vs. soldier and husband, produced a healthy level of mutual respect between husbands and wives, which organically seeded egalitarian beliefs in Spartan society.

The work of Xenophon is the single most illuminating synopsis concerning Laconian culture. His careful examination concerning women's lives and roles substantiates most of the observations and arguments made in this paper. As a native Athenian, Xenophon is particularly suited to note Spartan peculiarities. Athens is categorically Sparta's opposite and therefore serves as an excellent point of reference to highlight Laconian divergences from Greek norms. However, to uncover the attitudes of Spartan women, the best source is Plutarch. Few women are quoted in ancient history, but Plutarch makes an exception for Sparta. The fascinating collection of "Sayings of Spartan Women" in Plutarch's history of Sparta provides insight into these legendary women's psychology.

It is revelatory that numerous ancient historians like Plutarch, Xenophon, and even Aristotle (men not renowned for their regard for females) made Spartan women a focus in their dissertations on Laconia. Modern historians likewise are captivated by these extraordinary ancient ladies. Professor Cartledge goes as far as proclaiming that Spartan women were "The most remarkable women in all of Greece."[16] Aristotle, however, is not as charitable as the professor. In his second book on politics, he remarks with disdain, Sparta is gunaikokratoumenoi 'ruled by their women.'[17] Preceding Sparta's dramatic decline following the Peloponnesian wars, Aristotle argued that female emancipation ultimately led to the fall of what was once the most feared poleis in the Mediterranean.[18] Given the extremity of patriarchal social norms in classical Greece, Aristotle's line of reasoning is understandable. However, a careful study of Lycurgan law and Spartan economic conditions leads to a very different conclusion. Rather than acting as a catalyst for Sparta's fall, women, particularly Spartan mothers, animated Laconian civilization by embracing their maternal duty and imparting the Spartan ethos to future generations of hoplites. If distilled to its essential elements, the entire edifice of Spartan society exists to achieve two interdependent goals. One, to produce elite patriotic warriors, and two, to maintain control over the helot population.[19] Every Laconian convention is a consequence of these two objectives. The institution of Spartan motherhood is one of the most significant in achieving these state goals.

The decision to segment Sparta's female population along reproductive lines mirrors ancient Laconian inter-gender discriminations.[20] While the highest calling of every boy born in Classical Sparta was that of a warrior, the noblest pursuit for girls was motherhood.[21] In these two imperative yet polar roles (givers and takers of life), mothers and soldiers received the same degree of

[14] Ibid., 31.
[15] Ibid., 44.
[16] Cartledge, *The Spartans,32.*
[17] Ibid., 125.
[18] Paul Cartledge, "Spartan Wives: Liberation or Licence?," *The Classical Quarterly* 31, no. 1 (1981):86.
[19] Cartledge, *The Spartans,*28.
[20] Ibid., 125.
[21] Pomeroy, *Spartan Women,* 51.

respect and admiration from society. Spartan burial customs best exemplify the ultimate expression of this state of equilibrium. In true Laconic fashion, grave markers were considered too decadent for Spartan taste.[22] However, women who died in childbirth and men who perished in battle are the exceptions to the rule.[23] Sparta's famed religious piety makes this gesture all the more meaningful. This custom implies that the loss of a mother or a soldier is of equal significance to the polis. Nevertheless, why revere Spartan mothers to such a high degree if all other Greek women ostensibly possessed reproductive value? It is because motherhood in Sparta went well past the act of childbirth.

The Spartan Oikos (family) model differentiated vastly from other poleis. In the ancient Mediterranean, the family unit concerned itself with the perpetuation of the male line and prosperity.[24] Since Spartan law impeded commerce, the economic aspect of marriage is largely irrelevant. Plutarch makes a similar observation noting that all other familial obligations are secondary to reproduction and the common good in Sparta.[25] However, rather than diminishing the value of women in the household, economic freedom elevated the importance of motherhood.[26] With a permanent servile workforce (helots), Spartan women enjoyed the luxury of free time. With all the extra time and energy, women devoted themselves to fulfilling their sacred duty to the state. Maternal devotion is characterized by education, personal health/wellness, and eugenic-oriented matrimonial selection.[27] In these three realms, mothers were active players, proud of their role and defensiveover unnecessary male intervention.[28] Thus, while males monopolized military duty, mothers ensured a steady supply of honorable and strong sons joined their ranks.

Laconian marriage customs unfold as a consequence of the two Spartan imperatives (production of elite soldiers and control of helots). As previously mentioned, Spartan girls did not marry until their bodies developed fully, no younger than 18, and married men just a few years older. The underlying motive behind this tenet stems from a Lycurgan decree which admonishes couples to marry at their physical peak.[29] It is instructive to keep in mind that Sparta gained a reputation in the Peloponnese for producing excellent hunting dogs and horses.[30] Hence, they applied similar principles of animal husbandry to matrimony. Indeed, eugenic beliefs and practices colored much of Spartan society, even down to naming their public education system *agōgē* literally "the raising of cattle."[31] The practice of polygamy is one of many outgrowths of state eugenic practices.

While the agōgē and male infanticide effectively culled the adult male population of virtually all weak or disabled potential mates, some men married later in life or were incapable of producing heirs of their own. Nevertheless, Spartan law compelled such men to find a vigorous suiter for his young wife. Husbands consulted their wives throughout the selection process until they both felt satisfied with their choice.[32] In keeping with eugenic assumptions, such couples favored young Olympic champions

[22] Matthew Dillon, "Were Spartan Women Who Died in Childbirth Honoured with Grave Inscriptions?" *Hermes* 135, no. 2 (2007): 3.
[23] Pomeroy, *Spartan Women,* 52.
[24] Sarah B. Pomeroy, *Goddesses, Whores, Wives, and Slaves Women in Classical Antiquity* (New York: Schocken Books, n.d.), 62.
[25] Cartledge, *The Spartans,*169.
[26] Ibid., 36.
[27] Pomeroy, *Spartan Women,* 52.
[28] Ibid., 39.
[29] Xenophon, *Constitution of the Lacedaemonians*, Chapter 1
[30] Pomeroy, *Spartan Women,* 33.
[31] Cartledge, *The Spartans,*32.
[32] Pomeroy, *Spartan Women,* 44.

and warriors known for their bravery. Conversely, men called "tremblers," who displayed fear in a battle, were not only dishonorably discharged from service but forbidden from marrying or having children.[33] Facilitated by a general egalitarian disposition, the practice of polyamory flourished and maximized the procreative ability of fertile women.[34] So important was the reproductive window that Spartan law is conspicuously devoid of adultery restrictions.[35] Moreover, women quickly remarried if their husbands met an untimely death. Gorgo, the famous wife of King Leonidas on the day that the 300 Spartan knights set off on the suicidal mission to delay the Persian army at Thermopylae, is quoted by Plutarch to ask her doomed husband what she should do; and he said, "Marry a good man, and bear good children."[36] Spartan men (even kings) were replaceable, but a capable mother was not.

The likelihood of early death of her spouse in battle is partially the reason Spartan mothers ascended so high in the social hierarchy. Gorgo herself says nothing that contradicts Aristotle's accusation of "gynecocracy." On the contrary, the queen justifies female authority. In another famous account, Gorgo is asked by a woman of Attica, "Why is it that you Spartan women are the only women that lord it over your men?" to which Gorgo replied, "Because we are the only women that are mothers of men."[37] However, it is not the act of childbirth that affords prestige to Spartan mothers but their commitment to maximizing the physical potential of their offspring and their foundational contribution of imparting Spartan virtue.

As Spartans well understood from horse breeding, well-fed and physically fit mares produce healthy foals. Naturally, females enjoyed a nutritious diet and performed daily physical exercise.[38] Conversely, "In other states the girls who are destined to become mothers...live on the very plainest fare, with a meagre allowance of delicacies."[39] Not only did female Spartans eat more than Athenian girls, but they even ate better than Spartan men.[40] Holding the Spartan belief that personal physical fitness contributes directly to eugenic fitness, the implication of purposely feeding females more than males suggests that Spartans believed a good portion of offspring physicality comes from the maternal line. Moreover, the *agōgē* facilitated competition between females in "races and trials of strength for women competitors as for men, believing that if both parents are strong, they produce more vigorous offspring."[41] Women took their physical state very seriously, performing daily calisthenics and Olympic event training even while pregnant or advanced in age.[42] These social carrots and sticks were designed to populate "Sparta with a race of men remarkable for their size and strength."[43] Xenophon assumed his contemporaries were well aware of the superb athleticism of Spartan men from their reputation in war and Olympic games, but he offered to his readers the theory that maternal quality in Sparta was a contributing factor for their domination in sport and battle.[44] Still, the physical contributions of mothers was only half of

[33] Cartledge, *The Spartans,*163
[34] Andrew G. Scott, "Plural Marriage And The Spartan State." *Historia*: Zeitschrift Für Alte Geschichte 60, no. 4 (2011): 413.
[35] Cartledge, *The Spartans,*169.
[36] Plutarch, *Sayings of Spartan Women, 6.*
[37] Ibid., 5.
[38] Pomeroy, *Spartan Women,* 53.
[39] Xenophon, *Constitution of the Lacedaemonians*, 1.4.
[40] Pomeroy, *Spartan Women,* 53.
[41]Xenophon, *Constitution of the Lacedaemonians*, 1.5.
[42] Pomeroy, *Spartan Women,* 52.
[43] Xenophon, *Constitution of the Lacedaemonians*, 1.10
[44] Ibid., 1.4.

their role in the development of elite hoplite warriors.

In the critical years of early childhood, mothers exclusively raised and prepared their children for the *agōgē*. Mothers physically and mentally conditioned their sons and daughters to endure the brutal eleven-year curriculum that all youths commenced at the age of seven. A son who failed to graduate or at the very least die in the process brought great shame to his family.[45] Therefore, mothers likely accustomed them to the lifestyle and physical demands necessary to survive. This assertion better illuminates female habits of martial training and physical fitness. However, primary sources are not ambiguous in the assertion that mothers took care to transfuse the Spartan ethos into their children.[46] Good moms ensured their sons and daughters understood that their fealty was not to their family but the state. Neither their family nor their polis would tolerate any demonstration of selfishness or cowardice. To the Spartans, the maxim "death before dishonor" was taken literally. Take, for example, the account of one woman who was told by a messenger that all of her five sons perished in battle. To this, she responded, "I did not inquire about that, you vile varlet, but how fares our country?" And when he declared that it was victorious, "Then," she said, "I accept gladly also the death of my sons."[47] Of these unbreakable mothers, boys first received their education in what it meant to be a Spartan.

It is no wonder why Spartan women so captivate both ancient and modern historians. Not only were they singular among their peers, but it is impossible to appreciate Spartan history without understanding female societal functions. While the reasons for the fall of Sparta are disputable, Aristotle's "libertine" hypothesis does not recognize the rationale employed by Spartan law that warrants egalitarian gender norms. For Sparta to achieve military supremacy, women could not be marginalized to a domestic existence. In many ways, the role of Spartan men is less complicated than that of women. To the Spartan hoplite, war was all he knew, and he trained himself according to his profession. However, mothers trained for the good of their children and to live an exemplary life based on the Spartan creed. They were willing to sacrifice anything from the physical touch of their husband to the lives of their sons and daughters for the good of Laconia. Far from being the fatal flaw in Spartan society, the autonomy afforded to mothers contributed as much if not more to sustaining Laconian civilization as the deadly phalanx.

[45] Cartledge, *The Spartans,*169.
[46] Pomeroy, *Spartan Women,* 57.
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This is a paper written by a history undergraduate. This paper was the culminating product of a summer research grant that allowed the student to delve deep into sources and write up her analysis under the direction of a faculty mentor, Professor Stephen Lewis. Though formatted slightly differently for this journal, this paper used Kate L. Turabian's Manual for Writers of Term Papers, Theses, and Dissertations, which is typical of papers in this discipline.

Women's Fertility and Social Transformation in Modern Mexico, 1968-1988

Vivian Hernandez

The 1960s brought great change to the lives of Western European and American women. They were mobilized into the workforce like never before and actively participated in the student movements that swept the decade. The United States legalized birth control in 1960 and European countries such as Germany and France soon followed. This freed many women from unwanted pregnancy which consequently gave them more choices and freedoms in their personal lives. By the end of the 1960s, more than 80 percent of American wives of childbearing age were using contraceptives. However, this was not the case for Mexico, which trailed behind the U.S. and Western Europe in terms of family planning and population control for several significant reasons.

Historically, the Mexican government resisted contraception and instead encouraged population growth in an attempt to protect the north from U.S. expansion, to replenish the casualties suffered during the Mexican Revolution and the influenza epidemic, and to bolster economic development in the country. The 1947 General Population Law created regulations that prohibited the sale and use of contraceptives and criminalized abortion.[1] The government's pronatalist agenda continued to encourage the country's rapidly growing population and prohibited the use of contraceptives until the late 1960's.

The Catholic Church also delayed the acceptance of artificial contraceptives by denouncing them and encouraging women to have as many kids as God pleased. The church encouraged people to have large families and advocated for natural family planning such as the "rhythm method." This calendar-based contraceptive method relied on keeping track of a women's menstrual cycle and predicting when she was most likely to ovulate. The Catholic Church was still against the use of contraceptives in the late 1960s and through the 1970s when the birth control pill was introduced in Mexico. In July 1968, Pope Paul VI released *Humanae Vitae* which reinforced the Catholic Church's stance on artificial contraceptives and referred to them as intrinsically wrong.

Despite these political, economic, and religious restrictions, in 1968, the birth control pill was legalized. By 1970, 13 percent of married women used contraception. By 1980, that number had jumped to 40 percent. It coincided with other cultural changes in Mexican society that advocated for women to take active control of their bodies, minds, and careers. This change allowed women of all classes to participate more freely outside the home without the constraints of motherhood. In a society where women were expected to be subservient to their husbands and mothers to their children,

[1] Gabriela Soto Laveaga. "'Let's Become Fewer:' Soap Operas, Contraception, and Nationalizing the Mexican Family in an Overpopulated World," *Sexuality Research and Social Policy*, vol. 4, no. 3 (2007): 23.

contraceptives enabled women to challenge traditional gender roles by allowing them to enter the workforce, participate in politics, and obtain an education. For the first time in Mexico, women were able to gain control of theirbodies and their lives.

This paper will explore the main economic, political, and cultural factors that brought such a significant change to Mexican society. It will also explore how this shift in acceptance and widespread use of contraceptives affected the lives of Mexican women socially, politically, and economically.

Changing the Law: Political and Economic Motivations, 1970 to 1976

The Mexican government's efforts to encourage population growth succeeded; between 1950 to 1970 the population nearly doubled in size and grew at an annual rate of 3.2 percent.[2] The growth in the urban population can be associated with the increase in income that was created by what some economists called the "Mexican Miracle." The extension of modern health care to rural areas resulted in higher fertility rates and lower mortality rates. Consequently, there was an increase in the rural population. The efforts to grow the population, though, were too successful. Overpopulation threatened the growth in economic prosperity and globalization also seen during this same time period, which ultimately influenced the Mexican government to tackle its population problem. As researchers Chen, et al. suggest "the motivation for contraception depends on socio-economic development which in turn affects the desired number of children."[3]

This played out in the efforts of President Luis Echeverría who created government-sponsored family planning programs because he inherited a Mexico that was growing at an alarming rate. Echeverría, who held office from 1970-1976, "insisted that a better Mexico was one that regulated its population growth."[4]

The Echeverría administration launched its first national family planning campaign in 1972 in hopes that fertility would begin to decline. In 1974, Mexico made family planning the constitutional right of all married couples. This dramatic policy allowed married women to decide when and if they wanted to have children. Gabriela Soto-Laveaga states that this created a shift of "authority to determine how many children a couple could and should have from a religious platform to one where it was dictated by the state."[5]

This constitutional amendment challenged the Catholic Church's influence on family planning in Mexico. Many were concerned that Echeverría's administration would receive massive backlash from the Mexican Catholic Church but that was not the case. Jay Winter and Michael Teitelbaum reveal that

> some attribute this silence to the Mexican church's 'great tolerance regarding the contraceptive practices of its congregation.' Others reported that before announcing his new population policy in 1972, President Echeverría summoned churchleaders,

[2] Robert Reinhold. "Mexico's Birth Rate Seems Off Sharply." *The New York Times*, November 5, 1979.

[3] Jain-Shing A. Chen et al., "Economic Development, Contraception and Fertility Declining in Mexico," *Journal of Development Studies,* vol. 26, no. 3 (1990): 417.

[4] Gabriela Soto-Laveaga, *Jungle Laboratories: Mexican Peasants, National Projects, and the Making of the Pill* (Durham, NC: Duke University Press, 2009), 12.

[5] Gabriela Soto Laveaga, "'Let's Become Fewer:' Soap Operas, Contraception, and Nationalizing the Mexican Family in an Overpopulated World." 30.

> informed them of his decision, and made it clear to them that he expected to hear of noopposition to the policy from the church.[6]

Regardless of whether it was Echeverría's influence or the Catholic Church's genuine tolerance regarding the use of artificial birth control amongst its members, the Mexican government was able to implement successful family-planning programs without the expected strong opposition of the church.

On March 27, 1974, President Echeverría, along with the minister of state, the ministers of health and public assistance, the minister of public education, the minister of foreign relations, and "distinguished personalities" established the *Consejo Nacional de Población* (CONAPO), formed what was the country's first National Population Council.[7] The post-1974 ideals of population control attempted to "forge a better society not simply by creating better citizens but by having fewer of them."[8] By this time, the Mexican government realized the country was not creating enough jobs to sustain its growing population.[9] The cities and urban areas were becoming overcrowded with young people who fled rural areas in search of jobs and a better life. Therefore, the population control campaign had economic motivators behind it as well. The Mexican government continued to support the availability of birth control through the 1970s, and in 1975, public health agencies began to advocate for the distribution of free oral contraceptives in pharmacies.

The use of contraception was becoming widely available for middle-class women in urban and metropolitan centers under the Echeverría administration but not in more impoverished rural areas. The rural populations had much higher fertility rates and used contraceptives far less than their urban counterparts. Fortunately, Echeverría's successor continued his family planning legacy. President Jose Lopez Portillo implemented family planning programs that targeted rural areas and aided them with contraceptives. In 1977, these services began to spring up in the rural areas of the country. Widespread poverty, dispersed villages, and the lack of employment outside of the agricultural realm plagued rural Mexico. These issues led those involved in implementing the population policy to regard "the task of promoting increased contraceptive practice and lower fertility in rural areas as a major challenge."[10]

Vamos Haciendo Menos: Educational and Cultural Change, 1970-1986

Education was crucial to decrease the fertility rate among Mexican women.[11] CONAPO had conducted studies after 1974 that "showed that many of the previous family planning campaigns were considered unsuccessful because women simply did not have easy access to information about

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[6] Jay Winter and Michael Teitelbaum*, Population, Fear, and Uncertainty: The Global Spread of Fertility Decline* (New Haven: Yale University Press, 2013), 211.

[7] Gabriela Soto Laveaga, "'Let's Become Fewer:' Soap Operas, Contraception, and Nationalizing the Mexican Family in an Overpopulated World," 21.

[8] Ibid, 23.

[9] Vivianne B. de Márquez, "La política de planificación familiar en México: ¿Un proceso institucionalizado?" *Revista Mexicana de Sociologia,* vol. 46, no. 2 (1984): 290.

[10] Joseph E Potter, "The Persistence of Outmoded Contraceptives Regimes: The Cases of Mexico and Brazil," *Population and Development Review,* vol. 25. no.4 (1999): 715.

[11] Ansley J. Coale, "Population Growth and Economic Development: The Case of Mexico," *Foreign Affairs,* New York, N.Y., vol. 56, no. 2 (1978): 419.

contraception."[12] CONAPO officials hypothesized that education affected fertility indirectly through its impact on desired family size and on contraceptive utilization by increasing exposure to information and ideas disseminated through printed material.[13] In 1973, 70 percent of all contraceptive users relied on the commercial sector. By 1982, 53.4 percent of women began receiving their contraceptives through government-sponsored programs and by 1987 the number increased to 61.8 percent.[14] Sex education also had to occur at home in order for change to happen. By educating women on how to prevent pregnancies and what birth control options they had, they could gain control of their bodies and decide when and if they wished to have children.

CONAPO and Mexican media giants joined forces to get the message across to urban and rural households to reduce their sizes. Soto-Lavaega expresses that "throughout the campaign, the government acknowledged the increased presence of women in the workforce, of absent fathers, and of a population that was more urban than rural."[15] The first of three CONAPO sponsored family planning campaigns was introduced in 1974 under the name *Vamos haciendo menos.* This campaign specifically targeted macho men and passive women in an attempt to forge a better Mexico by creating responsible citizens who took on the responsibility of family planning. For example, a poster targeting passive women read:

> She who is a true woman assumes responsibilities and takes decisions over her own life, her family and her productive activities. She who is passive fears responsibilities. A true woman intervenes, has opinions, decides, participates, contributes… and is active. The passive one waits.[16]

The second campaign, *La Pequeña Familia Vive Mejor,* was launched in 1975.[17] This campaign expressed the need to have fewer children due to the socio-economic problems that plagued large urban spaces. The third campaign was implemented in 1976 and was titled *Señora: Usted decide si se embaraza.*[18] It became CONAPO's most controversial campaign because it encouraged women to decide on their own when and if they wanted to have children. This idea directly challenged the machista and patriarchal norms that permeated Mexican society. The campaign received significant backlash from men who believed the decision to have children was their own.[19] CONAPO used posters, magazine, newspaper, radio, and televisions slots to spread its message to the masses. In 1978, *El Programa Nacional de Educación Sexual* was created. The following year, CONAPO launched another campaign that focused on addressing the question, "*¿Que es planear la familia*?" This time, CONAPO used pamphlets with statistics and graphs to relay their message to the urban population. CONAPO's family planning campaigns encouraged Mexicans to be more active as citizens and take control of their reproductive decisions to better their lives.[20] Most importantly, the campaigns reflected a changing global scene and a

[12] Joseph E. Potter, "The Persistence of Outmoded Contraceptives Regimes: The Cases of Mexico and Brazil," 23.
[13] Jain-Shing A. Chen et al. "Economic Development, Contraception and Fertility Declining in Mexico," 419.
[14] Y. Palma Cabrera "Planificación familiar: Niveles y tendencias recientes del uso de anticonceptivos," *Demos,* (1988): 26.
[15] Gabriela Soto Laveaga, "'Let's Become Fewer:' Soap Operas, Contraception, and Nationalizing the Mexican Family in an Overpopulated World," 20.
[16] Ibid, 25
[17] Ibid, 25.
[18] Ibid, 25.
[19] Ibid, 25.
[20] Ibid, 25.

cultural change in Mexico which made it clear that the modern Mexican woman was no longer submissive.

From 1977-1986, CONAPO partnered with Televisa, Mexico's largest television company, to create *telenovelas* for development. The first of these telenovelas was *Acompañame* which aired in 1977.[21] It followed the lives of three sisters who made different decisions in terms of family planning. *Acompañame* was followed by four other *telenovelas* that encouraged Mexican couples to incorporate family planning in their relationships.[22] Soto-Laveaga comes to the conclusion that

> by incorporating family planning into the vision of the ideal familial unit, the state irrevocably challenged traditional female roles and instead, publicly and controversially, altered the role of the mother as a passive and obedient citizen to that of the modern wife as an active and vocal advocate of these new family values.[23]

CONAPO reported an increase from 0 to 500 calls asking for family planning information after *Acompañame* began to air on television.[24] Additionally, 2,500 women signed up to volunteer for the National Plan for Family Planning. Most importantly, there was an increase of 23 percent in contraceptive sales in 1977.[25] However, these changes did not occur for those who did not watch the *telenovela.* This campaign only impacted the lives of women who had access to a television and cable. Nevertheless, during the decade-long run of the *telenovela* campaign, Mexico's population growth decreased by an astounding 34 percent.

Mexico's Scientific Contribution to the Creation of *La Pildora Anticonceptiva*

Mexico played a direct role in the development of the birth control pill. Barbasco, a wild species of yam, played a critical role in developing of hormonal contraception and consequently prompted the Mexican government to make it accessible. The wild barbasco yam is native to Mexico's geography and can be found in the southeastern states of Tabasco, Chiapas, Veracruz, Oaxaca, part of Puebla, and smaller regions in México and Michoacán.[26] In the 1940's, Mexican scientists discovered that barbascos chemical compounds could be used to make steroids and oral contraceptives. Research with diosgenin, which is a precursor for several hormones, by the Mexican chemist Luis Ernesto Miramontes created what he believed to be a substance that would prevent women from miscarrying but instead became the basis for oral contraceptives.[27] Miramontes went on to become one of the co-discoverers of the chemical compound which led to the global production of oral contraceptives. The vast availability of the yams allowed for the mass production of oral contraceptives. Products derived from barbasco altered modern medicine, aided advances in science, and arguably, granted millions of women some control over reproduction.[28]

Echeverría was eager to fund and establish family planning programs due to the economic benefits that the distribution of barbasco-derived hormonal contraception could bring to the Mexican economy. The availability of barbascos and their contribution to the development of hormonal contraceptives made the yams a valued

[21] Ibid, 26.
[22] Ibid, 26.
[23] Ibid, 27.
[24] Ibid, 27.
[25] Ibid, 27.

[26] Gabriela Soto-Laveaga, *Jungle Laboratories: Mexican Peasants, National Projects, and the Making of the Pill*, 4.
[27] Ibid, 3.
[28] Ibid, 2.

commodity in Mexico. Echeverría's administration wished to capitalize off of theprofit that barbascos could create. In 1974, Echeverría spoke at CONAPO's inauguration and stated,

> I understand that it is only a few transnational companies who sell oral contraceptive pills…with that in mind I would like to urge Mexican researchers, that they discover Mexican pills so that they can curb the commercial influence of large transnational pharmaceutical companies that sell these pills.[29]

The yam therefore came to "symbolize the first step toward an independent Mexican pharmaceutical industry."[30] Mexico was able to profit from barbasco production while simultaneously tackling their population problem. Echeverría used barbascos as a way to maintain control in the rural countryside by stimulating economic development. The states where barbasco was grown were very impoverished and in need of economic development. The production of barbasco created many jobs for the poor rural communities in southeastern Mexico.

La Nueva Ola and Mexican Women's Political Participation

The introduction of contraception affectedthe lives of women socially, politically, and economically. The feminist, sexual, and student movements that swept through Western Europe and the United States also made their way to Mexico during the late 1960's and continued into the 1970's. The Tlatelolco massacre of 1968 pushed women to participate in the student movement and directly influenced the Mexican feminist movement.[31] Elaine Carey claims that "Mexican feminism was also influenced by events that took place beyond the nation's borders."[32] The student movements of the late 1960's gained a lot of exposure and were able to reach the Mexican audience. Moreover, the publications of intellectuals and journalists regarding the feminist movements of the late 1960's and early 1970's influenced Mexican women. Globalization and interconnectedness with the rest of the world allowed Mexican women to question and fight for many of the same beliefs and ideas that their counterparts in the United States and Western Europe were advocating. Rosario Castellanos and Marta Acevedo were two of the most important feminists during this time. They brought attention to the new wave of feminism emerging in the United States through their publications in the newspaper *Excélsior* and the cultural magazine *Siempre.* Castellanos and Acevedo paved the way for the Mexican feminist groups that would emerge in the 1970's and fight for the distribution of contraception to all women.

Educated middle-class women and university students were active participants of the second-wave of feminism in Mexico during the 1970's. Jocelyn Olcott expresses that

> Mexico's small but energetic feminist movement, dubbed the "new wave"- *la nueva ola*- of Mexican feminism, took on its inchoate institutional formation in 1970 with the founding of *Mujeres en Acción Solidaria* (MAS) under the leadership of MartaAcevedo, a leader during the 1968 student movement who had witnessed the Tlatelolco massacre.[33]

[29] Gabriela Soto Laveaga, "'Let's Become Fewer:' Soap Operas, Contraception, and Nationalizing the Mexican Family in an Overpopulated World," 22.

[30] Gabriela Soto-Laveaga, *Jungle Laboratories: Mexican Peasants, National Projects, and the Making of the Pill*, 127.

[31] Elaine Carey, *Plaza of Sacrifices: Gender, Power, and Terror in 1968 Mexico* (Albuquerque: University of New Mexico Press, 2005), 177.

[32] Ibid, 177.

The Mexican feminist groups of the 1970s played a crucial role in advocating for the distribution of contraceptives to Mexican women. Some of the other groups included *el Movimiento de Liberación de la Mujer* (MLM) and *el Movimiento Nacional de Mujeres* (MNM) which were composed of women who were brought together due to the marginalization and oppression they faced in their daily lives.[34] MAS held several conferences that directly addressed issues that Mexican women faced including "Abortion and Sexuality," "The Condition of Women," and "Feminism in Politics."

In 1975, the UN held the International Women's Year Conference in Mexico City. As Jocelyn Olcott states, "the Echeverría administration hoped that the International Women's Year conference would allow Mexico to showcase its efforts to address the intractable problems of inequality and population growth."[35] The Mexican government was eager to host the conference to gain global recognition, which some feminists disliked. The Women's Front against International Women's Year was organized to protest the conference and stated the Mexican government's state planning was "a lukewarm and opportunistic appropriation of feminist proposals."[36] The conference brought to light many of the issues Mexican women were facing such as making contraceptives accessible and the legalization of abortion.

First Lady Maria Esther Zuno, a longtime advocate for women's rights spoke at the conference. She addressed the "depressing alternative" women faced which was either "to become merely reproductive beings and renounce their social creativity or to sacrifice their maternity and abandon their family."[37] Zuno stated that women had to overcome this false obstacle in order to realize their full potential. Although Zuno's message encouraged women to enter the workforce, Joseph Lenti states that she did so "inside legally established frameworks and called upon the regime to pursue gender equality in a way that complemented its interventionist agenda."[38] Nonetheless, Zuno still pushed for strict equality in the workplace. President Echeverría also spoke and claimed that he wanted to ratify an amendment that would "incorporate women into all aspects of political, economic, and social life," but these remarks in the end exemplified the state's hypocrisy because such an amendment never materialized.[39] Regardless of whether women were for or against the hosting of the IWY conference, women mobilized together like never before to advocate for universal equality.

The formation of *La Coalicion de Mujeres Feministas* (The Feminist Women's Coalition) in 1976 was composed of six different women's organizations. *La Coalicion de Mujeres Feministas* began to fight for the idea of "voluntary motherhood." They advocated for "sex education specifically developed for different age groups and social sectors, reliable and inexpensive contraceptives, abortion as a last

[33] Jocelyn Olcott, *International Women's Year: The Greatest Consciousness-Raising Event in History* (New York, NY: Oxford University Press, 2017), 57.
[34] Estela Serret, "El feminismo mexicano de cara al siglo XXI," *El Cotidiano,* vol. 16, no. 100 (2000): 46.
[35] Jocelyn Olcott, *International Women's Year: The Greatest Consciousness-Raising Event in History,* 60.
[36] Ibid, 58.
[37] Joseph U. Lenti, *Redeeming the Revolution: The State and Organized Labor in Post-Tlatelolco Mexico* (Lincoln, NE: University of Nebraska Press, 2017), 218.
[38] Ibid, 218.
[39] Elaine Carey, *Plaza of Sacrifices: Gender, Power, and Terror in 1968 Mexico,* 185.

resort, and rejection of forced sterilization."[40] According to Marta Lamas, this agenda became "the basic component of the defense for reproductive and sexual rights in Mexico."[41] However, by the 1980's, "voluntary motherhood's" demands were overshadowed by the issue of abortion and the push to legalize it.

As women began to take control of their lives through the use of contraception, they were also able to participate in politics. In 1953, Mexican women were granted the right to vote in federal elections and were able to run for congressional representative seats. The 1968 Tlatelolco massacre was followed by "women's activism in social and political grass-roots movements, such as the student uprisings of the 1970s."[42] By the 1970's and 1980's, women were slowly becoming active at the national level but were especially active at the local level. Many women were being elected mayors and held municipal positions across the Mexican states. In 1979, Griselda Álvarez Ponce de Léon became the first woman to become elected governor in Mexico. The 1985 Mexico City earthquake also mobilized women politically to meet the demands of the families who had been affected by the disaster.

Mexican Women's Economic Mobilization, 1976-1987

Mexican society underwent economic and sociodemographic change during the 1970s and 1980s, two decades characterized by "accelerated urbanization, the extension of industrialization, an increase in rural migration to the urban centers, increased access to education and diversification of urban job markets."[43] These dramatic changes allowed women to enter the workforce in large numbers like never before. Between 1976-87, the number of Mexican women over the age of 12 reporting themselves to be economically active increased from 16 percent in 1970 to 21 percent in 1979. This number grew to 32 percent by 1987.[44] Before the 1970s, the Mexican women who made up a majority of the workforce were young and single, but a clear change occurred between 1976-87. Within a span of 11 years, the economic participation of older, low-income, and less educated women increased. Data from the 1976 Mexican Fertility Survey and the 1987 National Survey of Fertility have allowed scholars to connect the increase in women's economic participation with the total fertility rate decline. In 1973, the fertility rate of Mexican women was at a staggering 6.3 but by 1986 the number had decreased to 3.8. This 44 percent drop in fertility is directly connected to the introduction of modern contraceptives. The percentage of women of reproductive age who used contraceptives increased from 30.2 in 1976 to 53.7 in 1987.[45] Mexican women began to participate in the labor force while simultaneously raising their children. Women who worked before marriage or at early stage of family formation were significantly more likely to reenter the labor force in the future.[46] The economic recession in Mexico during the 1980's, also drove women to enter the workforce

[40] Marta Lamas, "The Feminist Movement and the Development of Political Discourse on Voluntary Motherhood in Mexico," *Reproductive Health Matter,* no. 10 (1997): 58.
[41] Ibid, 58.
[42] Sonia Hernández, "Women in Mexican Politics Since 1953," Oxford Research Encyclopedia on Latin America, (New York: Oxford University Press, 2018), 5.
[43] O. De Oliveira and B. Garcia, "Trabajo, fecundidad y condición feminina en Mexico," *Estudios demográficos y urbanos,* vol. 5, no. 3 (1990): 693.
[44] Y. Mier and M. Teran, "Descenso de la fecundidad y participación laboral femenina en Mexico," *Notas Población,* vol, 20, no. 56 (1992): 145.
[45] Ibid, 149.
[46] Ibid, 150.

Prior to introducing contraception and implementing family planning programs, Mexican women were participating in the formal and informal economic sphere. However, with a decrease in fertility rates and increase in education, Mexican women were able to join the workforce in larger numbers than before. Teresa Rendón Gan explains the earlier women begin to have children, the possibility of them entering the formal workforce becomes more limited.[47] Beginning in the 1970's, Mexican women's decreasing rate of fertility reduced the number of years women dedicated to raising and taking care of their children.[48] Rendón Gan explains that a drop in fertility rate in developed countries allows women to work as opposed to developing countries where the fertility rate is still high. Consequently, Mexican women were able to break away from their domestic duties at home and took on jobs in *maquiladoras* and as secretaries. Education also helped women gain access to the workforce. With more access to education, women could obtain better jobs, allowing them to get married later and have fewer children.[49]

Conclusion

The rapid increase in Mexico's population between the 1950's-1970's prompted the Mexican government to take the initiative to control its population growth. With the introduction of the birth control pill in 1968, Mexico's population began to decrease. President Echeverría and President López Portillo's family planning programs and services helped make contraceptives accessible while simultaneously changing how Mexican society viewed women. CONAPO's family planning programs created cultural change that targeted machos and passive women. The introduction of the birth control pill caused Mexican women to no longer be viewed as submissive individuals. Most importantly, the introduction of the birth control pill was crucial to Mexican women's participation in social movements, the political sphere, and the workforce because for the first time in Mexico's history, women were able to take control of their bodies and decide when and if they wanted to have children.

[47] Teresa Rendón Gan, *Trabajo De Hombres y Trabajo de Mujeres En El México Del Siglo XX* (Universidad Nacional Autónoma de México, México, D.F.: Programa Universitario de Estudios de Género, 2003), 72.
[48] Ibid, 72.

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This is a dual-author paper written by a biology undergraduate student with her faculty mentor, Professor Cawa Tran. This is a typical pathway for publication in the sciences. The student carries out research in the lab under the direction of faculty, and together they write up the description, analysis, and conclusions. This paper used the Council of Science Editors (CSE) Style Manual, which is typical for papers in this discipline.

Asexual Reproduction of the Sea Anemone *Exaiptasia Pallida* Under Artificial Moonlight

Cora Piper and Cawa Tran

Abstract

Many cnidarians live in symbiosis with intracellular algae (dinoflagellates from the family Symbiodiniaceae), and are provided nutrition through photosynthesis; in exchange, cnidarians provide their algal symbionts with protection from predation. In the sea anemone *Exaiptasia pallida* (commonly referred to as 'Aiptasia'), a model system for coral-symbiosis studies, planula larvae produced via sexual reproduction are initially aposymbiotic (without algae) and must obtain new algal symbionts each generation. In asexual reproduction, it is possible for pedal lacerates to acquire their algal symbionts from the parent. A previous study demonstrated that artificial moonlight can affect the rate of asexual reproduction in symbiotic Aiptasia, but it is unknown how asexual reproduction in aposymbiotic Aiptasia may differ. In this study, we hypothesized that the presence of algal symbionts and artificial moonlight together may enhance asexual reproduction in Aiptasia. We found that the rate of asexual reproduction in symbiotic anemones increased under blue light (artificial moonlight) but did not change under white light and no light. Meanwhile, the rate of asexual reproduction in aposymbiotic anemones did not considerably vary under the different light conditions. This study demonstrates how host reproduction is determined by the ability of photosynthetic endosymbionts to respond to light.

Key words: Aiptasia, *Exaiptasia pallida*, anemone, coral, asexual reproduction, pedal laceration, development, blue light, animal propagation, symbiosis

Sea anemones have an increased rate of asexual and sexual reproduction following a full moon by detecting the presence of blue light through ocelli (Tritt et al. 2017). In asexual reproduction, the anemone segments its body either through binary fission, pedal laceration, or budding, resulting ingenetically identical individuals (Chia 1976). Pedal laceration allows for the formation of a lacerate either through constriction or tearing of the pedal disk by contraction and extension of the body (Chia 1976). In sexual reproduction, a sperm and ovum, released from a male and female sea anemone respectively, come together in the water column to form a zygote, which develops into a larva (Schlesinger et al. 2010). The larva then settles on a surface and proceeds to grow into an adult polyp (Bucher et al. 2016). Even though sexual reproduction is evolutionarily important (Bocharova and Kosevic 2011), asexual reproduction is faster and more efficient. Asexual reproduction through pedal laceration is the reproductive strategy used by the tropical sea anemone *Exaiptasia pallida* ('Aiptasia') in the absence of a sexual partner (Clayton 1985).

Aiptasia CC7 clonal line (Sunagawa et al. 2009), hosting its endogenous *Symbiodinium* ITS2 type A4 strain SSA01 (Grawunder et al. 2015), was used in this study. The experiment consisted of six tanks

of twelve anemones each, observed over 25 days. Two clear tanks, one containing symbiotic and the other containing aposymbiotic Aiptasia, were placed in an incubator with 453 nm actinic blue LED lights (cat. no. 1663, TrueLumen Lunar Lights, Current USA, Inc.), serving as artificial moonlight. Additionally, two clear tanks (one with symbiotic and the other with aposymbiotic anemones) were placed in an incubator with 12K white LED lights (cat. no. 1644, TrueLumen Lunar Lights, Current USA, Inc.), along with two dark tanks (also one with symbiotic and the other with aposymbiotic anemones) receiving no light (Figure 1). Each tank was partitioned into 15 cells (each cell 25.4 mm × 31.8 mm × 6.35 mm) to track single anemones and their asexual reproduction (i.e., the number of pedal lacerates and juveniles to develop from the single adult polyp). Additionally, this design allowed anemones (both parent and offspring) and brine shrimp (their food) to remain healthy with plenty of oxygen from artificial seawater (Coral Pro Salt, Red Sea Aquatics Ltd., Houston, USA) at 32 to 34 ppt salinity. All incubators were on a 12:12 h light:dark photoperiod at a light intensity of 25 μmol photons m^{-2} s^{-1} and maintained at 27˚C.

During the 25-day duration of the experiment, the number of pedal lacerates, juvenile anemones, and adult anemones were counted three times per week prior to water changes and photographed under a stereo microscope (Leica M165FC). Three independent trials of this experiment were conducted. Following the experiment, a t-test was performed comparing the slopes (i.e.,rate of mean number of individuals) of (i) blue light to white light and (ii) blue light to the dark, for both symbiotic and aposymbiotic anemones (Figure 2). There was a significant difference between symbiotic anemones exposed to blue and white light (t-test, P<.001, Figure 2A), and blue light and the dark (t-test, P<.001, Figure 2A). Although there was also a significant difference between aposymbiotic anemones exposed to blue and white light (t-test, P<.001, Figure 2B), the rate of asexual reproduction under blue light was slower than that under white light and the dark, suggesting that blue light did not benefit aposymbiotic anemones at all. Taken together, these results suggest that symbiotic anemones benefit from blue-light exposure. Moreover, among symbiotic anemonesexposed to blue light, there was a greater proportion of juveniles over time (Figure 2C), indicating that pedal lacerates were ableto grow and develop normally into juveniles.

These findings demonstrate that exposing symbiotic Aiptasia to artificial moonlight enhances asexual reproduction. Given there was an increase in the reproduction of only symbiotic but not aposymbiotic Aiptasia in response to blue light, blue light is likely being detected by algal cells within the host and, in turn, potentially changing host behavior. Symbiodiniaceae have photo-receptors, such as phytochromes, crypto-chromes, and phototropins that detect various wavelengths of light (Xiang et al. 2015). As observed in a previous study with Aiptasia, the detection of blue light by algal symbionts induced a sustained phototropism in symbiotic, but not aposymbiotic, anemones (Foo et al. 2020). Light detection by Symbiodiniaceae may also alter thecircadian clocks of their anemone host. In a separate study investigating the influence of algal symbionts on host rhythmic behavior (Sorek et al. 2018), the average periodicity of extension and contraction of the anemone body in symbiotic Aiptasia was twice that of its aposymbiotic counterpart. However, the reintroduction of algal cells intoaposymbiotic Aiptasia restored that periodicity comparable to that of symbiotic Aiptasia, demonstrating the key role of Symbiodiniaceae in controlling the timing of body extension and

contraction in the host (Sorek et al. 2018). Therefore, if algal symbionts can detect blue light and mediate Aiptasia's body extension and contraction, itmay be possible that the algae are, in some capacity, signaling the host to extend a portion of its foot to gradually dissociate andform a pedal lacerate. This may be a probable method algal symbionts are using to affect host asexual reproduction, as they subsequently benefit and promote their own growth and division in a new individual animal, though precise mechanisms of host-algal signaling for this to occur are still unknown.

The effect of algal symbionts on anemone nutritional state may also play a role. We attempted to minimize the effects of variable nutrition by utilizing similar-sized anemones at the start of this experiment and providing each individual anemone with a consistent amount of brine shrimp as food, but symbiotic anemones are inevitably receiving extra nutrition in the form of photosynthate provided by their algal partners (Davy et al. 2012). In a previous study, symbiotic and aposymbiotic Aiptasia fed brine shrimp three times per week for 30 days produced a similar number of pedal lacerates; however, when both anemone groups were starved for 30 days, there were significantly more pedal lacerates produced by symbiotic than aposymbiotic anemones, suggesting that the presence of algal symbionts only mattered when anemones were lacking their food source. In our experiment, we maintained the food source but exposed both anemone groups to blue light and observed a significant difference in the number of symbiotic anemones over time. Therefore, we can conclude that blue light and the presence of algal symbionts are indeed inducing a higher rate of lacerate production, whereas the presence or absence of algal symbionts do not appear to matter when anemones were exposed to white light or the dark. Further development of those lacerates into juvenile anemones under blue light is also likely enhanced by the presence of algal symbionts, providing additional metabolites to the host to continue to support its growth and survival.

From a practical standpoint, this study uncovers a method to significantly improve laboratory propagation of Aiptasia, an important model organism for symbiosis research. In future experiments, the size of the tanks will be increased to a larger size (17.6 cm × 16.2 cm × 6.35 cm) typically used in normal laboratory maintenance of animals, with twelve anemones placed into each tank to verify that this form of propagation can be used on a larger scale. Through this experiment, we have explored some of the intricacies in how blue-light detection by algal symbionts can alter host growth and development. By supplying additional nutrition to the host and/or manipulating the host's body extensions and contractions, algal symbionts are either directly or indirectly improving the host's ability to asexually reproduce with the assistance of blue light as a source of artificial moonlight. This study provides a platform for further investigations into the mechanisms by which algal symbionts signal the host to induce pedal laceration. The cnidarian-algal symbiosis remains complex, as additional benefits previously unknown but exchanged by both partners continue to come to light.

Acknowledgments

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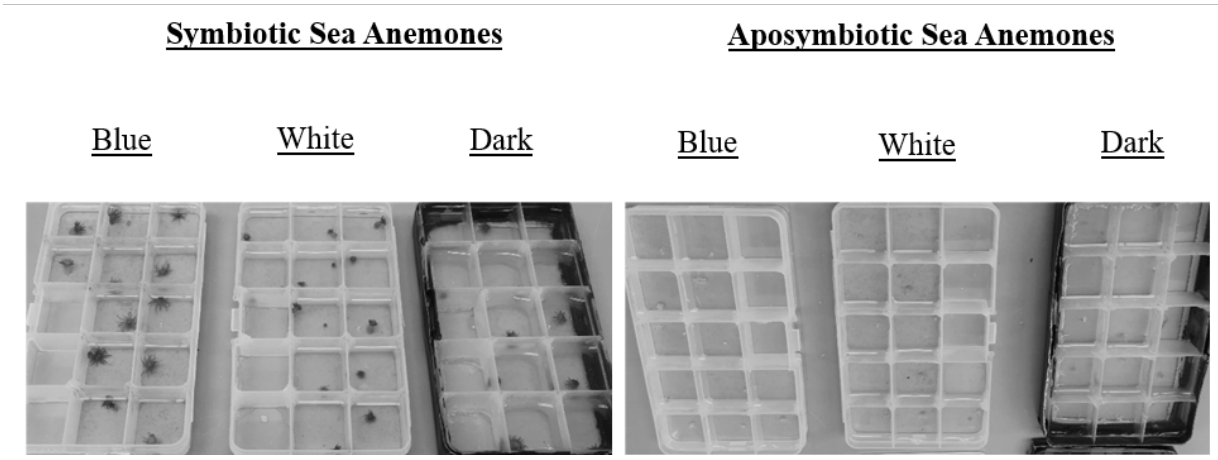


Figure 1. Asexual reproduction of symbiotic and aposymbiotic Aiptasia exposed to different types of light were observed. Each independent trial (of three trials total) consisted of two clear tanks exposed to blue light (mimicking artificial moonlight), two clear tanks exposed to white light, and two black tanks exposed to no light (i.e., completely dark). Black tanks included black lids and a black floor slip that tanks were placed on top of. The left three tanks contained symbiotic anemones (with algal symbionts) and the right three tanks contained aposymbiotic anemones (without algal symbionts). All tanks were maintained at a normal temperature of 27°C on a 12:12 h light:dark photoperiod. No light and white light served as controls to test the effects of blue light on asexual reproduction. Each anemone was fed 2 g of brine shrimp twice per week. Seawater was changed eight hours after each feeding and on one additional non-feeding day. Development and asexual reproduction were normal (generated new oral disks, stalks, and tentacles) in anemones exposed to all conditions.

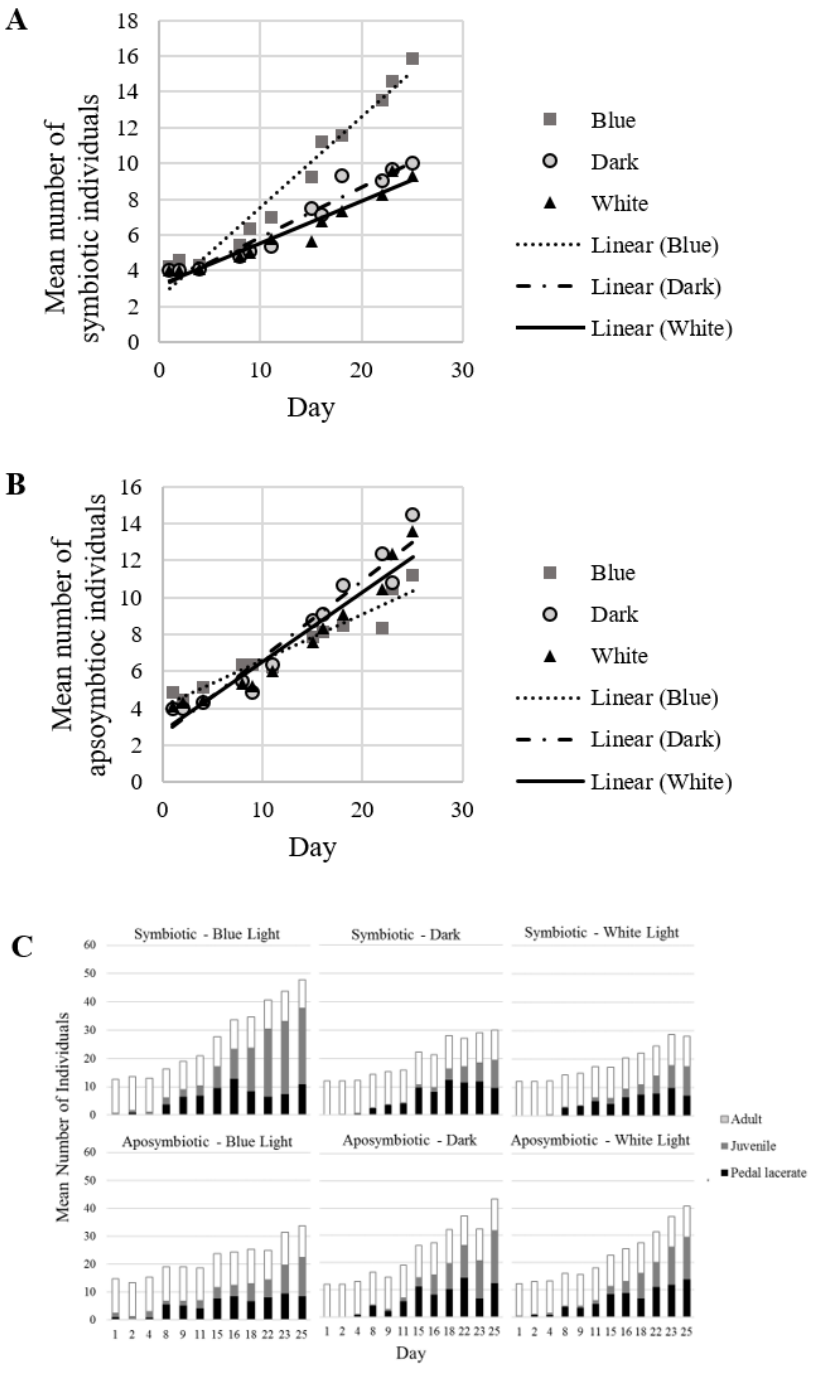


Figure 2. Asexual reproduction of symbiotic Aiptasia increased in response to blue light. (A) Mean number of symbiotic individuals across all developmental stages (adults, juveniles, and pedal lacerates) exposed to blue light significantly increased in number at a greater rate than those exposed to white light (t-test, $P<.001$) and the dark (t-test, $P<.001$). (B) Mean number of aposymbiotic anemones across all developmental stages (adults, juveniles, and pedal lacerates) exposed to blue light increased at a slower rate than those exposed to white light (t-test, $P<.001$) and the dark (t-test, $P=0.39$). (C) Among symbiotic anemones, there was a greater proportion of juveniles over time under blue light,

suggesting a more rapid rate of asexual reproduction and growth, in contrast to other light treatments. Among aposymbiotic anemones, there was no apparent difference in distribution of developmental stages among the light treatments. Adult and juvenile anemones had a mean body-column diameter of 16.25 and 2.35 mm, respectively, and pedal lacerates had a mean diameter of 1.55 mm. *n*=3 independent trials.

STUDENT ABSTRACTS

Observations of Morphological Differences in Faba Bean Plots Based on the Effect of Different Weed Management Practices

Consuelo Baez Vega

Faba beans (*Vicia faba*) are protein rich leguminous crops well known for their high nitrogen fixating properties, making them desirable for sustainable practices such as crop rotations and cover cropping. An important aspect of nitrogen fixation is nodule formation on roots of legume plants since this is where nitrogen conversion from an unavailable form to an available form occurs. The drawback to this beneficial crop is that it is a poor weed competitor, which could lead to loss in crop yield. A field experiment was conducted in Chico, CA (February and June 2020) to examine the faba beans' morphology with different weed management practices. The treatments included single applications of herbicide, mechanical, flame, and control group, while mixed treatments were mechanical and herbicide, mechanical and flame, flame and herbicide, and mechanical, flame and herbicide. The mixed treatment's purpose was to observe the benefits of integrated pest management. Each treatment and control consisted of four replications, placed randomly in thirty-six plots consisting of two faba bean rows per plot. Herbicide treatments were applied once prior to germination while mechanical and flame treatments were applied several times throughout the experiment. Morphology data collected according to treatment practices included plant height, biomass, and nodule count. It was determined that there was a significant difference in height and biomass based on the treatment implemented, particularly the use of treatments involving flame. Analyses on nodule count is currently being conducted where there was less nodule presence in herbicide related treatments, however future findings will reveal more data. The study found single flame treatment was a more effective weed management as it yielded the greatest biomass and second greatest plant height. Alternatively, combination of mechanical and flame yielded the second greatest biomass while single mechanical treatment yielded the third greatest height. It is valuable to know what type of weed management should be applied for faba beans to flourish in a less competitive environment. A repetition of this study, including pod production comparisons, would be beneficial to gather more data on the best weed management practice for faba beans.

The Effect of the COVID-19 Pandemic on Perceptions of Loneliness and Isolation in Older Adults

Allison Cardwell

Prior studies indicate that older adults who are already isolated show negative impacts to both their mental and physical health. The purpose of this study was to reach out to older adults during the pandemic and see if the extreme isolation individuals were under during this time of great hardship, had any effects on their perceived emotional well-being. Previous research on this subject helped form one hypothesis: the more isolated older adults were, the lonelier they would feel. A convenience sample from the Multipurpose Senior Services Program, or MSSP, was used. This is a program under the parent agency, Passages, the Area Agency on Aging. A paper survey was sent to 160 participants and a total of 72 were utilized. Two established, well-validated tools were used in the survey: the UCLA Loneliness

scale and the Lubben-6 Isolation Scale. The third scale was created of three questions regarding contraction of COVID-19. This was an assessment for anxiety toward potential. The results suggested a statistically significant correlation between a low Lubben-6 score (isolation) and a high UCLA score (loneliness), which validated the hypothesis that older adults, with small to no support systems in place, felt greater levels of perceived loneliness. There was also a significant correlation between a high UCLA score for loneliness and a high COVID-19 score. Participants who were lonely were also anxious about contracting the virus. Researchers must continue to explore the world of older adults. As Baby Boomers retire, they will utilize more services such as health care. This will change the economy, families, the job market, the environment, housing, and almost every area of life. For programs like MSSP, research findings recommend getting lonely people together for activities like outings to the coffee shop, a phone buddy or other ventures to create friendships. This study found older adults suffered greater levels of anxiety due to the Pandemic, yet it is unclear if Covid-19 is to blame for the isolation and loneliness scores as well. Clearly more research is needed. One solution is greater human connections. Time spent together is a life well lived.

Pentachlorophenol has Significant Adverse Effects on Hematopoietic and Immune System Development in Zebrafish (Danio rerio)

William Dowell and Aleeza Namit

In November 2018, the Camp Fire devastated the mountain community of Paradise, CA. The burning of plastic pipes, wiring, construction materials, paint, and car batteries released toxic chemicals into the environment, contaminating the air, soil, and local waterways. Examples of toxins that were identified in the creeks and waterways in and around Paradise included pentachlorophenol (PCP), chrysene, and polyaromatic hydrocarbons. The effects of some of these chemicals on embryonic development, hematopoiesis (blood formation), and the immune system have not been thoroughly studied. Defining safe levels and the long-term effect of exposure is imperative to understanding and mitigating potential negative outcomes. To perform these studies, researchers utilized zebrafish (*Danio rerio*), a commonly used vertebrate model system to study development. Following collection of transgenic zebrafish embryos and administration of varying concentrations of PCP, researchers observed the adverse effects of PCP on hematopoiesis. Transgenic zebrafish were used in conjunction with fluorescence microscopy as a means to visualize specific blood cell types in developing zebrafish. Data collected from these observations suggest that increased concentrations of PCP decreased the numbers of normal red blood cells and myeloid cells. Additionally, this study found that animal survival decreased in response to increasing concentrations of PCP. Furthermore, the prevalence of characteristic physical deformities such as pericardial edema and severe tail curvature were greater in the treatment groups. Although PCP has not previously been tied to birth defects, these data may warrant future investigation into the effect PCP has on other areas of embryonic development. Lastly, expression of *runx1*, a transcriptional regulator expressed during the second wave of hematopoiesis, was reduced in fish treated with PCP. These results suggest that PCP has a previously underappreciated effect on blood andimmune cell development and future studies should be performed to determine the molecular mechanisms involved. However, more broadly, this study provides a basis for further investigation into the unforeseen risks that

exposure to chemicals liberated during wildfires may pose to human health.

Carbon Sequestration Through Biochar Production as a Sustainable Agricultural Practice

Armin Fazlic

Throughout conducting research and development in the field of biochar production from agricultural and environmental wood waste, biochar has proven to be a viable method of carbon sequestration given adequate scaling. Biochar production in an anaerobic or a decreased oxygen environment can achieve a clean wood burn with less carbon output. The purpose of precise burn control is to have adequate safety in place for the operator, and to stop the burn at a stage where biomass has been converted to high-quality biochar, a high purity carbon charcoal. By maintaining the carbon in a macroscopic physical form, we can eliminate roughly 50 percent of waste by volume, while maintaining a low carbon footprint. Data analysis is in progress through collection of samples from different burn units, which will be compared to other biochar samples to determine moisture variability, biochar's mass, and life cycle. Positive results are expected of biochar, with high porosity and high carbon purity. Weight reduction of carbon will vary based on its moisture content in wood material. The primary focus of current research is on orchard long-term utilization as a soil amendment. When different amounts of biochar were mixed into soil, it has shown positive impacts on the crop's health and yield. Biochar has hygroscopic qualities allowing it to behave like a form of water storage when water is scarce, which plants are readily capable of absorbing. Small cavitation formed in the burning process called pores in biochar have further shown evidence to behave as microbiomes allowing for microbial life to live inside, consume and recycle surrounding nutrients. This cycle can remain continuous for as long as the biochar maintains its integrity, and ultimately produces nutrients for plant life to consume as the biochar begins to go through various physical and chemical changes. As agricultural crops finish their life cycle, we propose this biomass to be processed and converted into biochar, and farmers reintroduce it into soil for next crop's consumption. This cycle can ultimately sequester carbon, preserve water, and decrease fertilizer impact on runoff contributing to undesirable eutrophication in natural waterways.

Caffeine Use Disorder: Associations with Impulsive and Risk-Taking Behavior

Natalia Garcia

Recently there has been debate whether it is appropriate to add Caffeine Use Disorder to the next publication of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). The aim of this study was to determine if past week caffeine consumption (mg/week) is associated with higher impulsive and risk-taking behavior. This study also aimed to determine if higher Caffeine Use Disorder scores are associated with higher impulsive and risk-taking behavior. First, participants completed a demographics questionnaire. Those indicating past year drug use completed the DSM-IV Substance Use Criteria and the proposed criteria for Caffeine Use Disorder. Participants who reported past weekly caffeine use also completed the Caffeine Consumption Questionnaire. Next, participants responded to three tasks. First was a personality-based assessment known as the Barratt Impulsiveness Scale version-11. Then, a Probability Discounting Task (PDT) and a Delay Discounting Task (DDT); these tasks were counterbalanced. The PDT was

used to measure risk-taking behavior of participants, and the DDT was used to measure impulsivity among participants. Upon completion of the survey participants were debriefed. Final sample size consisted of n=166 participants. Results were interpreted using a multiple regression analysis with backwards elimination. There was a total of 5 backward regressions, each including the same predictor variables. The research found that the PDT, DDT, and BIS-11 second order factor of attention yielded no significant associations after final analysis. The second order factor of motor yielded a positive significant association with the predictor variable age, suggesting older participants scored higher on motoric impulsivity. The second order factor non-planning also yielded a significant positive association with total caffeine consumption, suggesting higher caffeine consumption totals were associated with higher non-planning behavior. This second order factor also yielded a second significant association with the predictor variable DSM caffeine score. This association was negative, suggesting lower criteria met for Caffeine Use Disorder was associated with higher non-planning behavior. Overall, the findings entail that total caffeine consumption may be the better indicator of behavior disruption; this is valuable information when determining criteria to include for Caffeine Use Disorder.

Multiscale Simulation of DNA Nanostructures for Drug Delivery

Greg C. Gutierrez and Michelle Gomez

Design and synthesis of systems the operate at nanometer length scales and incorporate the unique properties of deoxyribonucleic acid (DNA) has emerged the field of DNA nanotechnology. Recently, structural DNA nanotechnology has found various applications in a variety of fields spanning energy harvesting to nano-theranostics. For drug delivery, one objective is to determine whether DNA can act as a suitable molecular container, capable of delivering drugs without rupturing. Here, we present the scaffold design for four specific three-dimensional nanostructures including a box, two variations of a triangular prism, and a multi-chamber triangular prism. Each of these nanostructures is designed to facilitate the encapsulation, transport, and dispersion of specific drugs at targeted locations within the human body. The size and geometries of each structure were chosen based on the ability to fully encapsulate a varied range of drug sizes. Both thermodynamic and mechanical stability of these structures within an environment that mimics thehuman body is demonstrated via molecular dynamics and finite element analysis simulations of each structure, respectively. Thermodynamic stability implies that the structures will stay intact while under the pressure, temperature, and chemical combinations they would experience inside the body. Similarly, mechanical stability addresses external forces within the human body will not damage the structures. These results indicate that these structures could very likely be candidates for drug delivery vessels. Further research will be performed to simulate the interaction of more molecules within the nanostructures described above. Experimental synthesis would then be the next goal.

COVID-19 and Structural Violence in America: The Case of Blue Collar Latinx Workers in the Meat-Packing Industry

Daisy Linsangan and Magaly Quinteros

This ongoing ethnographic study focuses on Latinx meat-packing industry workers in the San Joaquin Valley who are physically, socially, and economically affected by the COVID-19 pandemic. Statistics on COVID-

19 pandemic infections and deaths in the United States reveal that minority populations, including African Americans and Latinx individuals, are significantly impacted. This study attempts to analyze how COVID-19 entered meat packing facilities, how it affected the livelihood of thousands of Latinx meat packing workers, and what social, economic, psychological, and physical challenges they faced. The Principal Investigator (PI) and secondary investigators will continue to examine how the global pandemic both highlights and contributes to the threat of a Central Valley Latinx community's well-being. A structural violence framework will be applied to analyze how the inequities and injustices embedded in social and institutional structures within American society have affected Latinx meatpacking workers and worsened conditions during the time of COVID-19. As of April 2021, three Latinx meat packing employees of the Central Valley Meatplant (CVM) were interviewed. The investigators observed similarities in the workers accounts regarding how their employer lacked to provide adequate COVID-19 safety protocols and how they were mistreated by human resource management. When put into the framework of structural violence, their livelihood has been physically, economically, and psychologically disrupted by the disease and is worsened by political and economic schemes by their employers, the Trump administration, and policies and practices of public health and immigration. This study can provide a platform for Latinx meat packing workers to voice their experiences of marginalization, to advocate for workers' rights and to provide a thorough understanding of how American institutions perpetuate marginalization. This study was impacted by COVID-19 restrictions because of IRB restrictions the entire study was conducted virtually. Further in person investigation is needed; possible recommendations include in person participant observation, gathering data from more interviewees, and exploring the perspectives of those higher up in the hierarchy of the meat industry.

The Impact of Covid-19 on Latinx Families in California

Alejandra Moreno, Daisy Cedillo, and Veronica Lopez

Previous research indicates that Latinx individuals may face unique barriers to employment, education, and access to resources due to language barriers and immigration status. The circumstances of the Covid-19 Pandemic heightened already existing inequalities for many individuals and essential workers faced additional risks of contracting Covid-19. The purpose of this study was to explore the impact of the Covid-19 Pandemic on Latinx families in California in July 2020. Adult participants (n=125) identifying as Latinx were recruited throughout California using snowball sampling methods in English and Spanish. A mixed-methods survey with questions surrounding childcare, employment, financial burdens, education, and access to resources. The results of the questionnaire found changes in childcare for families with young children during the pandemic. From the results, most families had to provide childcare for themselves. Statistically significant findings surrounding education identified that being a college student predicted changing residences. College students were more likely to move back to their hometown due to the cancellation of in person classes, the loss of employment because of the closure of business, and not being financially able to pay for their apartments, encouraging their moves back home. In regard to employment, results showed that it was more likely that a

participant lost their job during the national lockdown. Only a few participants were classified as an essential worker where they got to keep the employment that they had prior to the lockdown. Findings also showed financial worry was the most common difficulty. One of the reasons was the access to resources. Participants felt that they were not properly prepared for the pandemic and were not given the right resources to help combat the experience. As the pandemic was a rapidly evolving event, findings were limited in this cross-sectional study. Preliminary results generated additional research questions for further inquiry and recommended follow-up studies regarding educational impacts to children, long-term impacts of loss of employment, impacts specific to college students, and reasons for household composition change for Latinx families as the result of the Covid-19 Pandemic.

mustn1a **is Essential for Normal Vertebrate Hematopoiesis**

Aleeza Namit

Hematopoiesis (blood formation) is the differentiation of adult stem cells called hematopoietic stem cells (HSCs) into the multitude of blood cells present in the body. This biological process is vital in the early developing embryo and is sustained throughout an organism's lifetime. Our research laboratory uses the *Danio rerio* (zebrafish) model to explore hematopoietic and immune system development and has successfully identified 447 genes thought to be important for these processes. Of these genes, *mustn1a* (musculoskeletal, embryonic nuclear protein 1a) had high expression in areas of hematopoiesis, indicating that its presence and function is vital to this process. Understanding the role of *mustn1a* in hematopoiesis in zebrafish can better our understanding of the evolutionary history behind this process in all vertebrates. To elucidate the role of *mustn1a* in blood formation, expression of the gene was knocked down in developing zebrafish embryos using *mustn1a*-specific morpholino (MO). MOs are molecules that target the translational start site for *mustn1a*, preventing the mRNA from being translated and the protein from being made. Newly fertilized eggs were harvested and injected with MO via microneedle injections at the single-cell-stage. By inhibiting the gene's expression in this way, the resulting deleterious effects on hematopoietic development were assessed. Thus far, knockdown of this gene results in a reduction of neutrophils, erythrocytes, and thrombocytes in developing zebrafish. These observations were made with transgenic zebrafish, which have specific fluorescent tags for each of these cell types. The knockdown of this gene also resulted in body axis deformities in the zebrafish morphants. From previous studies we know that this gene is important for condensation of mesenchyme (an early embryonic tissue) to form cartilage and bone, and our observations give us reason to think it is involved in mesodermal differentiation (blood is derived from mesoderm, too). In essence, *mustn1a* is important for zebrafish hematopoiesis as well as formation of other mesodermal structures.

California State University, Chico

Students' Attitude Towards the News

Roxzel Soto Tellez

Studies have shown that overt partisan news networks, the sensationalization of news stories, and misinformation caused trust in the news to decline. The term "fake news" raised news outlets' credibility and instigated further ideological polarization. This research aimed to determine the external factors that influence the manner one

interprets the news. The study focuses on the various aspects and biases that affect attitude and perception of the news. Surveys were sent via email to two thousand ninety-three randomly selected California State University, Chico students. One hundred and eighteen students responded to the survey regarding their consumption, perception, and interpretation of the news. The quantitative data was examined to find variables that influenced student's perception of the news. Preliminary analysis suggested that CSU, Chico students feel strongly about several issues, including police brutality of minorities not being reported in the news, racial and ethnic representation in the news, and Blue Lives Matter. The research found many strong relationships between variables affecting student's attitudes toward the news. A correlation that stood out was students with a very favorable opinion of Trump supporters had a significantly higher level of agreement that racial discrimination by law enforcement is not as bad as the media portrays, than students with an unfavorable opinion of Trump supporters. The finding demonstrated another strong correlation among white students being more likely to agree that their race was portrayed positively in the news than students of color. Further research with more participants would provide a better overview to comprehend influences that affect perception of the news. Implications of the study are that news media literacy to recognize one's own biases and partiality in news stories would benefit CSU, Chico students. Training for news literacy may provide students with the tools to identify bias and encourage critical thinking about information in the news.

Body Image and its Effects on Male and Female Ethnic-Minority Adolescents

Vicky Wong

Adolescents associate their body image as part of their identity, however having a negative body image can lead to an increased risk for developing severe body image disturbances and eating disorders. Not much research on body image has focused solely on ethnic-minority adolescents in a school setting. It would be advantageous to understand more about this population and their relationship with body image. The current study investigated the relationship between ethnic-minority middle school and high school students' intrapersonal and interpersonal functioning with their views and feelings towards body image. A total of 189 ethnic-minority adolescent students completed several questionnaire surveys: Eating Attitudes Test-18 (EAT-18), Multidimensional Body-Self Relations Questionnaire – Appearance Scale (MBSRQ-AS) and Social Emotional Health Survey – Secondary (SEHS-S). The Latent Profile Analysis (LPA) approach was used to find and draw out possible similarities and differences from individuals based on their responses and create distinct memberships of those with similar profiles. A 3-class membership emerged: 1) Low Appearance Satisfaction/Low Appearance Maintenance (LO); 2) High Appearance Satisfaction/Low Appearance Maintenance (Hi Sat/Lo Ma); and 3) Low Appearance Satisfaction/High Appearance Maintenance (Lo Sat/Hi Ma). Grade level was not a covariate. The Hi Sat/Lo Ma profile reported the healthiest attitudes and behaviors towards body image and most likely to have a membership of males compared to both LO and Lo Sat/Hi Ma profiles. The LO profile had the lowest body and appearance satisfaction and most likely to have a membership of females compared to both Hi Sat/Lo Ma and Lo

Sat/Hi Ma profiles. Factors such as perceived social support and self-esteem are linked to body image. These findings support the proposal that screening, prevention efforts and early intervention should be provided for all students, especially ethnic-minority students, in a school setting as it can help to reduce challenges in receiving help from professionals. Helping students gain media literacy and develop positive body image are some ways to help students with body image and promote healthy attitudes, behaviors, and practices.

COVID-19 & Student Basic Needs: Understanding Impacts of the Disruption and CARES Emergency Funding

Tatiana Ybarra, Suyet Peralta, Daniel Celis, and Mariela Cuna

This project utilized a student research team to conduct focus groups among students who received the CARES ACT emergency grant. The CARES act was funded in April 2020 from the US Department of Education with $6 billion for universities and authorized by the Coronavirus, Aid, Relief, and Economy Security Act. The purpose of this study was to collect and advocate on behalf of the student population to facility administrators to better understand the disruptions of the pandemic. We sought to better understand the impact of COVID-19 on food security, housing insecurity and homelessness on student success. In an effort to draw a sample of students who had experienced some recent financial challenges, the research team utilized a list of 469 students and from that list a total of 26 students participated. A large portion of the study population received the first, second or both of the CARES funds distribution. The several group interviews were held on Zoom and recorded and transcribed on Otter. Following the coding, the team conducted a thematic analysis with findings that have affected their lives during the pandemic as a student. It was clear that for many students, while families are a strong support system, at times their limited resources became an added stress for students both financially and emotionally. We found repetitive themes overlapping such as loss of employment, negative impacts on mental health, additional support for student resources, and one that stood out which was lack of diverse representation of facility. The implications of this study found that while the CARES distribution was a great resource there were other factors that affected the lifestyle of students that need additional support.

GRADUATE ABSTRACTS

The Audacity to Live

Alondra Adame

The Audacity to Live investigates the different intersections of identity for a queer Chicanx writer. I explore my relationships with gender, sexuality, ethnicity, and more through the form of the personal essay. In this collection of essays, I navigate and critique higher education as a first-generation student, write an encouraging and heartbreaking letter to my teenage self, contemplate my identity as a nonbinary pansexual woman, and more. In the accompanying Critical Introduction, I discuss the craft of the personal essay, authors and influences such as craft writers Brenda Miller and Suzanne Paola as well as personal essay practitioners Jennine Capo Crucet and Cathy Park Hong, and market considerations. The form of the personal essay provided an ideal framework for creating meaning out of my personal experiences through analysis and reflection. Most of the essays in *The Audacity to Live* jump around chronologically but are threaded together by the character of Alondra who is always vividly recounting a memory, providing cultural analysis, or looking forward to future possibilities. While the personal essay aims to highlight select moments in scenes and includes a narrator and reflection as a memoir might, it also asks the writer to contextualize their experiences and analytically address larger questions about culture and society. The character of Alondra and her thoughts, memories, desires, and complaints from young adulthood are tools to reflect a complex narrator that provides critical analysis of current societal and cultural issues such as racism, homophobia, ableism, and more.

Nuestras Experiencias Como Bilingues en Agencias de Protección de Niños

Vania S. Buck

Bilingual social workers are essential in serving families whose first language is Spanish and who seek services from agencies designed to primarily serve the dominant culture in the United States. In child welfare, families who are monolingual in Spanish primarily depend on bilingual social workers who are responsible for providing appropriate language services required by federal law. Yet, bilingual child welfare social workers often face difficulty translating professional terminology and child welfare jargon due to the lack of training, professional development, or support from their agencies. There is minimal research on the type of support bilingual social workers in child welfare receive and need to adequately serve families such as Spanish-speaking ones or how the lack of training affects outcomes of Latinx families in child welfare. To explore the experiences of bilinguals – in English and Spanish – in child welfare, I conducted a qualitative cross-sectional study and used virtual interviews with 13 social workers throughout California. The study aimed to identify the positive and challenging experiences bilingual social workers live through when serving Spanish-speaking families. I designed the study to bring awareness to child welfare agencies by discovering the areas where bilingual social workers need the most support. This study revealed that positive experiences among bilingual social workers consisted of connections and support provided directly or indirectly by their agencies such as outside translation services, translated materials, and access to bilingual supervisors. Challenges, as described by participants, were the extra

tasks bilingual social workers carry and the lack of Spanish-speaking professionals in the field. Analysis of the data revealed a need for informational, emotional, and tangible support from child welfare agencies to better prepare bilingual social workers in their success in providing appropriate services to their Spanish-speaking families. Acknowledging and addressing the challenges bilingual social workers face when serving monolingual families will better prepare and support them in their practice; it will in return contribute to better outcomes among the Latinx community involved in the child welfare system. My research will add to the minimal literature in this area and bring attention to this social justice issue.

What's in a Name? A Study of Community Voicing and Place Naming Decision-making in Response to a Social Movement

Sheila Mary Burke

In the summer of 2020, amid social unrest related to the Black Lives Matter movement and civic debate regarding public symbols, activists throughout the US demanded removal or renaming of monuments and public spaces. Monuments honoring Confederate symbols, colonialism, and white privilege came under fire in response to increasingly overt racism in American discourse. These calls were not without controversy. Some community members view removal and renaming as reactionary and lacking a thoughtful process. They believe monuments and place names should be maintained. Still, there is a growing call to remove or rename - and do so responsibly by engaging with the public. This case study follows the removal of the name "Sir Francis Drake" from a northern California high school. My goal in this study is not to debate Drake's merits (which are widely disputed) or to provide an opinion regarding removal of symbols; rather I provide an evaluation of community engagement and communication methods used by civic leaders in the renaming process. I will provide an assessment on the level of legitimate community voicing in the decision-making process, identify which stakeholder voices were considered, and explore how much leverage community leaders should have when it comes to treasured places – all in an attempt to answer the question, how do community decision-making processes enable and constrain community voicing in the context of a social movement? I deployed multi-methodological, interpretive approach to research, exploring the history of place naming and renaming, and retracing the details related to this specific project through public listening sessions, press coverage and one-on-one interviews with multiple stakeholders. Additionally, I have applied Freedman's stakeholder theory as the standard for community engagement. In consideration of this social movement focused on symbols of oppression and racial inequality, I recommend updates to Stakeholder theory to better center historically marginalized voices. Findings indicate that acceptance of change was impacted by the degree community members were authentically involved in the decision-making process. By disregarding stakeholder input, civic leaders eroded trust and negatively impacted public acceptance of change. This study can inform civic leaders communication methods in matters of public interest.

The Struggle is Real: The Imposter Syndrome and the University Experience of Black Female Students at Chico State

Cara Campbell

The study investigated impostor syndrome symptoms and examined daily experiences among Black female students, who attend a

predominantly White university in Northern California. The Impostor Syndrome "phenomenon" is a psychological pattern that creates feelings of self-doubt, lack of belonging, and incompetence, despite prominent achievements and accomplishments. However, the original theory was conceptualized by a group of White women, which may not acknowledge culturally relevant influences for Black female students such as race, gender, or racialdiscrimination. Furthermore, only a few studies focus on impostor syndrome with Black female students and their educational experiences. Data collections include quantitative research by online survey instruments, distributed via email and social media outlets. The survey consists of four instruments: (1) Informed Consent (see Appendix A); (2) Demographics (see Appendix C); (3) Daily Struggle Survey (see Appendix C); and (4) Imposter Syndrome(see Appendix C). The 45 respondents reported frequent daily struggles on campus while having moderate levels of imposter feelings. Data analysis revealed there was no correlation between imposter syndrome and participants' daily experiences in highereducation. Yet, there was a strongly identified relationship between imposter syndrome symptoms and experiences of daily struggles with topics of: lack of a sense of belonging, isolation, self-doubt, and low-self-esteem. It is essential for academic institutions and their occupants to recognize and understand the experiences of Black female students to ensure stronger support for them academically, culturally, and professionally. For instance, create proposals that require more inclusivity in hiring committees that could result in more diverse staff, require Black mental health counselors to provide a safe setting for students of color seeking services, and develop proposals that require study centers or academic spaces for students who identify as Black. Future implications from this study on practice, research, policy, and directions are discussed.

The Journey to College Success: A Pilot Study

Alaina Castor

Research on first-generation college students (FGCS) shows that these students face unique challenges adapting to higher education which may be exacerbated for current students facing additional challenges due to the global COVID-19 pandemic. Additionally, this student population is pertinent to the California State University, Chico's campus as 52 percent of students identified as FGCS during the Fall 2020 semester. The purpose of this qualitative pilot study was to explore how FGCS students compared to non-FGCS were adjusting to higher education during a global pandemic, to identify factors that play a role in helping or hindering them in their academic journeys, and to identify what students personally value as important to their college success and wellbeing. Both FGCS and non-FGCS responded to 11 open-ended questions about their decisions to attend college, their current college experiences, and overall college experiences. Students also responded to a question in which they ranked items from most to least important relevant to their college success and wellbeing. Mann-Whitney U Tests indicated no significant difference between how FGCS and non-FGCS ranked items except on anxiety mindset where FGCS ranked it lower than non-FGCS. Furthermore, both student groups ranked grit components; passion and perseverance, as first and second in importance to their college success. They also ranked intelligence mindsets as the third most important. This is in further alignment with students' responses to the open-ended questions. Qualitative results showed that financial security, both mental and physical

health, and adapting to an online format has been difficult for both groups of students, suggesting a need for more support in these areas. All students similarly indicated that course content and enrollment was easier than expected, suggesting that students are adequately supported within the classroom. It was also revealed, in responses to multiple questions, that both FGCS and non-FGCS highly value passion, perseverance, growth mindset and social emotional support in their pursuit of higher education. Results from this pilot study inform an upcoming thesis study investigating these variables in their relation to college success and resilience, specifically as protective factors for FGCS.

The Camp Fire, Solastalgia, and Disaster Case Management

Blake Ellis

On November 8th of 2018, the Camp Fire devastated the towns of Paradise, Magalia, Concow, and several communities nestled in the Sierra Nevada foothills. In the months following the fire, a profound sense of loss reverberated throughout the region. The areas affected by the Camp Fire were once covered in dense, beautiful forest, but now the landscape is barren and unrecognizable. As a changing climate continues to increase the incidence and ferocity of wildfires in California, human populations are exposed to devastating societal losses, ecological loss, and environmental degradation. Research has begun to show that after severe environmental degradation, people mourn the loss of cherished home environments. "Solastalgia," a term created by the environmental philosopher, Glenn Albrecht, describes the grief associated with the loss of place and environment. Solastalgia encapsulates the mental, emotional, and spiritual distress experienced when cherished places and landscapes are transformed beyond recognition. This study utilized a longitudinal, mixed-method research design to explore the perceptions and experiences of disaster case managers (DCMs) responsible for supporting individuals and families on their journey to recovery following the Camp Fire. Through pre- and post-test surveys and focus groups, data revealed that DCMs gained an increased awareness of the overwhelming impacts of grief, trauma, solastalgia, and sense of place. For the DCM's who were directly affected by the fire, time spent in service to other survivors reduced their self-reported feelings of solastalgia, suggesting that service has the potential to heal and reduce emotional distress. Results showed that place attachments were broken, and the effects of trauma permeated survivors' place meanings and place identities which negatively affected their mental health, disrupted relationships, and complicated recovery. Future research should provide an exploration into what variables contribute to better client outcomes and reduce solastalgia. The solastalgia scale could be integrated into DCM training, client needs, health, and community recovery assessments. An understanding of solastalgia could inform public health planning, disaster recovery, social work, and land management to improve community resilience and outcomes.

Zoom University: The Effects of Covid-19 on Student Success at CSU Chico

Emilee Hunt, Alaina Castor, and Giang Hang

During Spring 2020, students across the world transitioned to virtual learning during the COVID-19 pandemic. California State University, Chico administration examined the impact of the pandemic on student success to improve campus services and student well-being. Under the supervision of the Assistant Dean for Undergraduate Education, all data was gathered and

distributed to a team of student researchers for analysis. The team analyzed data from multiple sources including mixed methods surveys (n=2998) and focus groups (n~139) administered across various courses, organizations, and departments. Data was both aggregated and raw. Through Grounded Theory methodology, five main themes emerged from the data: mental health, student concerns, financial concerns, university concerns, and technological concerns. *Mental Health* centered on the emotional and interior world of the student; students expressed increased stress, anxiety, and mental health needs, struggles with motivation, and anxiety over Zoom and webcam use. *Student Concerns* centered around social and exterior life, and highlighted students questioning the quality of their education, grappling with asynchronous and online studies, and struggling with their physical environment during virtual learning. Additionally, students expressed concern with building connections and community, balancing academics, work, and home life, and navigating online programs. *Financial Concerns* included issues such as job and housing loss, difficulty securing stable internet connection, and lack of computer access. *University Concerns* centered around issues with campus communication, mixed responses in evaluations of faculty and university administration, and limited access to campus resources. *Technological Concerns* included students expressing difficulty navigating online programs, experiencing internet outages, locating resources, and accessing general help. Key recommendations included: promoting mental health resources and access, increasing virtual social events to enhance sense of belonging, implementing pedagogical changes to reflect the complexity of virtual learning, expanding financial support and resource information, and enhancing outreach and communication from the university. As a result of this research, over thirty campus-wide changes have occurred. School administration is currently implementing most of these recommendations, including a one-stop information center where students can connect to financial resources, learning tools, and mental health support. This research can help guide future studies to better support distance education students.

Investigation of the *nifH* Gene and Diazotrophic Activity in the Sea Anemone *Exaiptasia Padilla*

Jaime Lopez and Cawa Tran

Supplementation of inorganic forms of nitrogen into nutrient-poor environments is carried out through microbial nitrogen fixation (diazotrophic activity). Oligotrophic environments, like those that coral reefs inhabit, are scarce in nutrients but biological hotspots for diversity. The success of corals is credited to their symbiotic relationship with a diverse community of microbes (photosynthetic algae, prokaryotes, and other microbes), and together, the animal host and its associated microbes are collectively known as a holobiont. Nitrogen-fixing bacteria (diazotrophs) have an association with various coral species, indicating they are key members of the coral microbiome. Within the last few years, studies have shown that environmental changes can stimulate diazotrophic activity, resulting in different impacts on various coral species. In some species, diazotrophs provide the host with an alternative source of carbon when bleached. In others, stimulated diazotrophic activity induced traits seen with coral bleaching. As a result, our comprehension of diazotrophs and their activity in corals remains two-sided and needs further investigation. To detect the presence of diazotrophs in the sea anemone *Exaiptasia pallida* (a laboratory model for

coral studies), the biomarker gene for diazotroph identification, *nifH*, was targeted in symbiotic (with algae) and aposymbiotic (without algae) anemones. Gene abundance and expression of *nifH* were determined using qPCR in all samples. Furthermore, nitrogen-fixation rates were indirectly assessed by an acetylene reduction assay on symbiotic and aposymbiotic anemones. Amplicon sizes of ~394 bp and Sanger sequencing confirmed the existence of diazotrophs in symbiotic and aposymbiotic anemones. Two independent trials of the acetylene reduction assay suggested the presence of diazotrophic activity (thus, nitrogen fixation) in symbiotic anemones. If diazotrophic activity differs between symbiotic and aposymbiotic anemones, there may be major implications of how diazotrophs interact with the algal symbionts specifically. This study elucidates the role of diazotrophs in the holobiont and expands our understanding of how microbes contribute to nutrient cycling within animal hosts susceptible to environmental changes. Future work evaluating anemone-associated diazotrophs should focus on (i) determining nitrogenase activity and *nifH* abundance and expression under heat stress, (ii) identifying species of diazotrophs using culture-dependent and -independent techniques, and (iii) localizing diazotrophs to specific anemone tissues.

Smoking Monkeys, Drunken Jaguars: A Formal Study of El Zotz-Style Ceramics

Dana G. Moot II

Since the 1970s hundreds of looted ceramics of related styles have found their way into public and private collections around the world through the international antiquities and black markets. These objects were later found to have been illegally excavated at the ancient Maya archaeological site of El Zotz, Guatemala. Over the past few decades, a corpus of related vessels has been identified and compiled by various scholars of Maya art. Since their original context has been occluded and their stratigraphic information has been lost, traditional archaeological seriation has proven difficult to develop and apply to these objects. Through the application of formal analysis, pairwise comparison of all the individual graphemes used throughout the corpus and paleographic scrutiny, though, some of the original social contexts as well as a general chronological sequence for them can be recreated. Since some of these vessels contain the names of kings in their respective texts, this relative chronology reveals a framework for the reconstruction of a dynastic sequence. Demonstrating stylistic change over time, it also reflects the iconographic and conceptual development of particular spiritual practices and supernatural entities. It is hoped that this study will provide a methodological framework and demonstration of efficacy for the future research of similarly problematic collections of objects that have been looted and subsequently exchanged on the international art market, which is the status of most Maya ceramics.

Trinity County Needs and Opportunities Assessment

LuAnn Peitz

Trinity County, California has a long, unstable economic history based in a cycle of economic boom and bust. This cycle has resulted in high rates of poverty and poor health outcomes for the small and rural communities of this mountainous and largely isolated county. The young people of Trinity County provide an opportunity to inform both the needs and opportunities that will shape policy change. This study focused on the health, social, and educational needs of youth by combining existing quantitative data with the voices of youth from all five

Trinity County high schools. Using the central tenets of youth-led participatory change, focus groups were held throughout the County to garner youth voice and vision. The following themes organically surfaced from young people: Trinity County has a strong sense of community, natural helping networks, limited economic opportunities, limited infrastructure, suspicion of outsiders, and an illegal underground economy. An undertone of the six themes was geographical and political isolation. In addition to the specific themes was an important underlying factor, school culture. School culture at the various schools was significantly different likely due to a variety of factors including the school personnel, the students themselves, as well as the economic and resource variations across the county. Across the schools the students stated they would like to improve town infrastructure and create jobs by building local businesses. Another popular idea was building affordable housing for the economically disadvantaged. The students shared they would like more mental health services along with the creation of drug rehabilitation centers for youth and adults. Other responses varied across different schools as each school had their own stated needs. The results of this project have surfaced the many opportunities and challenges for Trinity County youth. According to the research, two significant factors lay the foundation for the unique experiences of young people here: the cyclical nature of the raw materials industry and geographical and political isolation. These components have largely contributed to the environment of poverty that has shaped the current deficit in economic opportunities, access to resources, and infrastructure in Trinity County. This is a social justice issue requiring the participation of the entire community including the next generation to effect equitable social policy change.

Bacterial Exposure Impacts Host Health of the Sea Anemone Exaiptasia Pallida

Kaitlyn Romo

Coral reefs are threatened by rising ocean temperatures associated with climate change. Coral survival depends highly on the three-way symbiosis involving the coral host, intracellular algae, and bacteria, together making up the holobiont. As ocean temperatures rise, the holobiont undergoes stress, which ultimately leads to the breakdown of the host-algal symbiosis and the growth of pathogenic bacteria. All partners' roles and functions must be elucidated to understand symbiosis breakdown and assist corals in the fight against climate change. In this study, the sea anemone, *Exaiptasia pallida* (commonly referred to as 'Aiptasia'), a common laboratory model for coral-symbiosis research, was used to investigate three key bacterial species associated with both Aiptasia and corals. *Ruegeria mobilis*, *Vibrio alginolyticus*, and *Alteromonas macleodii* were separately inoculated into the seawater of both symbiotic (with algal symbionts) and aposymbiotic (without algal symbionts) hosts to investigate their effects on host health. Each bacterium was hypothesized to have a different effect on host health—beneficial, pathogenic, or no effect. Various densities (0, 8×10^7, 8×10^8, 2×10^9, 3×10^9 and 7×10^9 cells/ml) of each bacterium were used to assess impacts on host survival over 14 days at 27°C, and one density (8×10^8 cells/ml) of each bacterium was used to determine its effects on host biomass, protein content, and algal abundance over 7 days at 27°C. When compared to uninoculated hosts, *V. alginolyticus* decreased survival of symbiotic and aposymbiotic hosts, and decreased host biomass by 27 percent and 54 percent in symbiotic and aposymbiotic Aiptasia, respectively. *V. alginolyticus* also decreased algal abundance by 20 percent in symbiotic

Aiptasia. *R. mobilis* increased animal-host survival, biomass by 9 percent, protein content by 50 percent, and algal abundance by 60 percent of symbiotic Aiptasia. *A. macleodii* had no major effects on host health. *V. alginolyticus* had negative impacts on host health, while *R. mobilis* appears to be a beneficial bacterium and warrants further investigation. Identification of specific, beneficial microbes is a major contribution to conservation techniques, such as microbiome manipulation, that aim to assist cnidarians in adapting to climate change.

Decolonizing Museums: Native Narratives and K-12 Education

Meegan Sims

My research explores Northern California museums' efforts to decolonize and their potential use of their education programs to facilitate decolonization in K-12 schools. Decolonization, according to various scholars, is a series of processes that include restoring land, identity, and cultural and political freedoms and repatriating cultural objects and human remains to groups that have been impacted by colonialism. My research focuses on the decolonization of Native peoples who have inhabited and still inhabit California. Various literature has been published about decolonization within U.S. museums, however, there is limited literature about California. There are three overarching research questions addressed in this thesis: (1) How do museum staff and K-12 educators perceive decolonization? (2) How can the methods of decolonization, according to scholars and Native individuals, become more accessible and organized? (3) How can museum education programs facilitate decolonization in K-12 schools? In order to explore these questions, I conducted surveys of museum staff, K-12 educators,and Native individuals from Northern California along with interviews of Native individuals. The data shows that there are gaps in the museum staff and K-12 educators' understandings of decolonization. To address the gaps in knowledge, the methods of decolonization are organized into phases and indicators. The literature, surveys, and interviews from Native individuals and scholars show that there are phases or differentiated steps of decolonization and each phase has specific practices or indicators. When museums implement the phases and indicators in every aspect of their institution, they can begin addressing their colonial history and the colonial ideologies that are embedded in their practices. Concurrently, museums can also fill the gaps present in K-12 state curriculum by strengthening their relationships with K-12 schools and developing educational programs that discuss Native peoples and decolonization.

Pregnancy, Stigma, and Mass Media: A Narrative Analysis of Reporting about Miscarriage

Travis Souders

Miscarriage is often a source of trauma, grief, isolation, and depression for those who experience it. Research across disciplines suggests that stigma influences a variety of health outcomes; consequences of stigma surrounding traumatic health events, like miscarriage, have particularly harmful consequences for mental health. Drawing from the disciplines of sociology, psychology, and communication, this study explores stigma as a fundamental cause of disease and health inequality generally. It also examines stigma as a social phenomenon and process with direct consequences for depression and isolation associated with miscarriage. This study is compelled by findings from recent research revealing connections between communication practices and patients' internalization of

stigma in miscarriage. Perceiving and heeding an interdisciplinary call to identify the varied forces that contribute to the structure of stigma, and to confront the social norms, policies, and other mechanisms that facilitate the process of stigmatization, I investigate public communication surrounding miscarriage as both a source *and resource* for miscarriage-related stigma. This study deploys rhetorical criticism as a method used to understand how and why members of the U.S. public are persuaded to understand the experience of miscarriage in particular, often prescriptive ways. The primary analysis of public-facing documents in this study applies to online columns, news websites, and social media, particularly focusing on miscarriage support communities that attempt to normalize miscarriage through the sharing of personal narratives. By identifying common themes, verbiage, tonality, and other salient rhetoric, this study interrogates the communicative roots of stigma and suggests alternative methods for confronting and ultimately overcoming stigma that often accompanies experiences with miscarriage. Identifying communicative strategies that mitigate stigma among miscarriage survivors could instruct meaningful approaches for mass media to similarly normalize miscarriage and communicate about it in non-stigmatizing ways.

Positive Thinking Techniques for Higher Education to Reduce Stress and Increase Well-being: An Online Module for College Courses

Amanda M. Taylor

Positive thinking skills and techniques can improve an individual's outlook on life. This changed outlook can improve through areas such as better grades, more motivation, healthier body, clearer mind, and overall increased well-being. Higher education institutions can be a stressful environment. To help mediate this stress, an online module titled *Try Your B.E.S.T.* was designed to teach the skills of positive thinking to students in higher education. The *Try Your B.E.S.T.* module focuses on the following four common positive thinking techniques:

- Breathing
- Empowerment
- Stressing Less
- Transforming Thoughts

These four domains are the foundation for positive thinking techniques and are constructed as four parts of the online module. The study explored the creation of stress-reduction modules and outcomes of positive thinking during stressful events. The *Try Your B.E.S.T.* module teaches students in higher education, skills and techniques to increase their positive thinking, reduce stress, and increase overall well-being. The research designed contained a pre-survey and a post-survey to analyze students' stress levels before the implementation of the *Try Your B.E.S.T* module and after the completion of the module. These surveys were administered via an online format through the course the participants are enrolled in. The pre-survey was given before the module begins. The online module is a four-week design, so week zero was the pre-survey and at the end of week four was the post-survey. The responses were anonymous. Roughly 125-175 students were eligible as participants. Upon reviewing the results from the pre and post survey, it can be concluded that the *Try Your B.E.S.T* module was successful in regard to providing students with positive thinking techniques. The results of the surveys show a decrease in participants' stress and a decrease in participants' negative emotions with an increase in their positive emotions. Students were provided positive thinking tools, techniques, and resources to assist with combating negative thoughts, bad

stress, and the overwhelming feeling of daily stressors.

Achievement Without Opportunities, the Higher Education Equity Gap: A Survey to Inform the Impact of Systemic and Colorblind Racism

Katherine Vargas

The history of the United States is replete with racist policies and practices, implemented even before statehood in colonial times. More than four hundred years later, detrimental impacts remain along with outdated discriminatory policies and practices which continue to generate inequitable socioeconomic outcomes, especially evident in higher education racial equity gaps. This study examined the existence and impact of racism, bias, and discrimination in higher education, using California State University, Chico as a sample population. All students, staff, and faculty were solicited to participate in an anonymous, electronic questionnaire. Qualitative and quantitative responses from the 890 participants noted the severity of racism. Results were statistically significant and revealed 56 percent of students (632) and 55 percent of staff and faculty (248) having either experienced or witnessed racism, bias, or discrimination at Chico State. Based on the research and analysis of qualitative data, recommendations were made to Chico State leadership to support moving past antiracist non-performativity, and into creating a transformational impact by engaging in truly antiracist work.

Proselytizing Modernity: Reexamining the Summer Institute of Linguistics' Tenure in Mexico, 1934-1979

Juan Vega Ramirez

The Summer Institute of Linguistics was a faith-based linguistic organization from the United States that entered Mexico in 1934 to translate the Bible into Mexico's indigenous languages. It developed a symbiotic relationship with the government despite its proclaimed missionary aspirations and its ties to U.S.-based Protestant communities. However, its missionary-linguist dual identity and unchecked influence over indigenous people compelled its detractors to accuse the organization of propagating cultural imperialism and committing ethnocide. The Mexican government ignored these accusations for several decades because SIL linguists facilitated the state's national agenda. By 1979 however, Mexican officials abruptly cut ties with the SIL and cited its connections to organized religion as a deciding factor. This project examines the Summer Institute of Linguistics' rise and fall in Mexico to provide insight into the mechanisms the Mexican government employed to encourage national integration, promote modernization, and maintain control over an increasingly dissatisfied populace. It will add to SIL historiography by demonstrating that SIL missionary-linguists helped indigenous communities even though they also sought to change the culture of the people they contacted. In doing so, it will shine a light on Mexico's economic and social policies during a time when the promises of the Mexican Revolution began to ring false. Ultimately, the SIL was neither as sinister as its detractors claimed nor as benevolent and innocent as its supporters maintain. For the Mexican government, the SIL was a means to an end. When that result was increasingly called into question, it threw its longtime ally overboard to save itself.

Barriers to Nutrition and Dietetics Education Among English-as-a-Second Language Students: An Exploratory Study

Jennifer White, Seth Klobodu, Lauren M. McNamara, and Keiko Goto

Diversity in the nutrition and dietetics profession is essential for providing culturally relevant nutrition care. Despite efforts to increase diversity, the profession remains primarily non-Hispanic white (72 percent) and female (85 percent). Notably, there is a rise of diverse students in nutrition and dietetics programs particularly those with English-as-a-Second Language (ESL). Diet-related illnesses are predominantly higher among minority populations. Poor nutrition and diet contribute to six of the ten leading causes of death in the US. Therefore, the objective of this study was to explore barriers to nutrition education for ESL students and identify potential strategies for success. A grounded theory approach using in-depth structured interviews was used to gather experiences of participants who were currently enrolled in or had completed the nutrition program at a mid-sized public Western US university. Thirteen ESL students were recruited using a purposive snowball sampling method. This multi-cultural sample included both international and domestic born ESL students. Collectively, the students spoke eight different languages with Spanish being the most common language. The primary barriers identified by ESL students included language, financial difficulties, immigration concerns, and a lack of support systems. Overcoming these barriers took self-motivation, confidence, and support from trusted sources like faculty, advisors, and their peers. Academic strategies that supported their learning included visual learning techniques, opportunities to practice their English skills and share their culture, multiple choice exams, and access to class materials early enough to prepare for lectures. Participants suggested tutoring for nutrition and Didactic Programs in Dietetics courses, cultural considerations, and recording classes as recommendations for supporting future ESL students. This study gained valuable insight into the unique experiences of ESL students. The results of this study are an initial step to understanding the challenges ESL students face. This research also provides information that could be used as the basis for developing strategies and programs to meet the needs of ESL students. Further exploration of these barriers may assist in ensuring an equitable learning experience for ESL nutrition students to foster diverse growth and advance the nutrition and dietetics profession.

About Our Student Authors

Undergraduate Students

Consuelo B. Baez Vega is a Chico State transfer student from her local college, College of the Desert, where she received her associate's degree in natural resources. She arrived at Chico in 2016 with the goal to get a bachelor's degree in agriculture. While being Chico State undergraduate student, Consuelo has had the privilege to be involved in research regarding faba beans as well as cover crops alongside renowned professors in the College of Agriculture. She also had the honor of attending several conferences where she presented her research, gaining valuable experience. One of her most recent achievements was to be awarded first place in the 2020 research symposium poster contest in Crop Production and Managements at the SASES conference for her work in faba bean weed management practices.

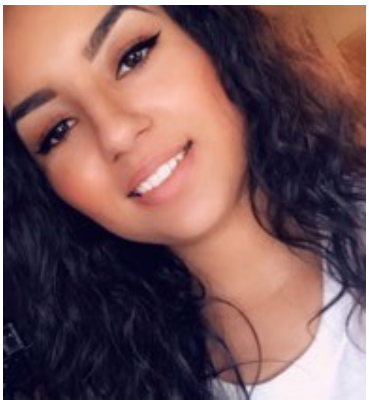
Allison Cardwell is a respiratory therapist who went back to school to obtain a bachelor's degree in social work. She now works where she interned, at Passages, and hopes to gain experience working with the older adult community as she prepares to apply to master's programs. In her free time, she plays the harp, is involved in her church, and is a writer. Her life is full with the joy her four grandchildren bring to it, and there is never a dull moment in the Cardwell house.

Daisy Cedillo graduated as a first-generation student with a bachelor's degree in social work with a minor in child development, one in gerontology, and a general education pathway minor in ethics, justice, and policy studies, as well as a certificate in gerontology from Chico State. Cedillo is currently pursuing her Master of Social Work at California State University, San Marcos.

William Dowell obtained a bachelor's degree in cellular and molecular biology along with a minor in chemistry from Chico State in spring 2021. In fall 2021 he matriculated to the University of Vermont's Cellular, Molecular and Biomedical Sciences PhD program, where he will continue to study biology in the context of human health.

Armin Fazlic is a senior at Chico State and is pursuing his bachelor's degree in civil engineering. He has a wide range of research interests but is particularly interested in research with an emphasis on sustainability practices and has pursued hands-on experiences that combine both research and practice, working with biochar for several years. In addition to his work in the field, Armin also holds a position as president of Sustainable Environmental Engineering for Health Development (SEEHD), a club on campus that focuses on issues related to environmental engineering and health problems.

Natalia Garcia recently graduated with a bachelor's degree in psychology from Chico State. She will be continuing her studies at CSU Dominguez Hills where she will be completing a master's in clinical psychology and working toward attaining her clinical counseling licensure. Her areas of interest include the psychological areas of addiction and its influence on the decision-making process, the study of psychopathology, and mental health. Her goal is to one day become a professional clinical counselor and work one on one with clients, helping them navigate through their hardships.



Michelle Gomez is a first-generation, low-income student currently pursuing a bachelor's degree in mechanical engineering at Chico State. She considers herself a well-rounded individual, who is enthusiastic about gaining new knowledge and experiences, as well as enhancing her skills in various fields. She is a hands-on learner with an ongoing motivation to achieve her goals. Her dedication has helped her grow as a student and as woman in STEM.

Greg Gutierrez graduated from Chico State double majoring in mechanical engineering and physics. His work focuses on the practical use of various hollow DNA nanostructures as a molecular container fordrug delivery. While an avid Chargers and Padres fan, he enjoys fishing along Deer Creek and SolidWorks modeling.

Vivian Hernandez is a senior double majoring in history and Latin American studies with minors in Spanish and global development studies. Her research interests include modern Latin American feminist, gender, and women's issues. Her current research focuses on the impacts the introduction of oral contraceptive had on Mexican women in the second half of the 20th century. Vivian hopes to expand her research by examining the role men played after the introduction of contraception in Mexican society to transform it into a gender analysis.

Daisy Linsangan graduated from Chico State in spring 2021 with a bachelor's degree in anthropology with a focus inforensic anthropology. Her research interests include Latinxmigration patterns. She hopes to work alongside the US-Mexicoborder to help retrieve and identify migrant remains to contact and bring closure to families who have lost their loved ones. Shewill be applying for grad school in fall 2022 to develop more research as a forensic anthropologist.

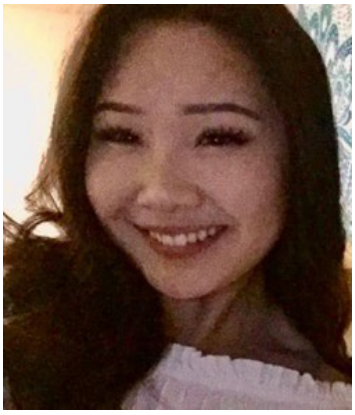
Veronica Lopez was born and raised in Santa Cruz, and graduated from Chico State in 2021 with a bachelor's degree in social work and a minor in sociology. Veronica currently works with at-risk youth in Sacramento. Veronica was interested in research because she wanted to see how research affects the access individuals have to resources, and hopes to take what she learned into continuing to work with youth and become a behavioral specialist.

Alejandra Moreno was born and raised in Salinas. She graduatedin spring 2021 with a bachelor's degree in social work and minorin family relations. Alejandra is currently serving Yuba and Sutter Counties, working as a mental health rehabilitation specialist. Alejandra hopes to pursue her master's and serve as aschool counselor, and help normalize putting mental health as apriority.

Aleeza Namit is currently pursuing a bachelor's degree in cellular and molecular biology at Chico State. Her research interests include studying hematopoiesis, which is the process of blood formation in zebrafish. As a student researcher in Professor David Stachura's laboratory, she is primarily focusing on studying the importance and role of a certain gene involved in hematopoiesis. She is also exploring the effects of toxic chemicals found in the waterways of Paradise after the Camp Fire in 2018, on the developing immune system of zebrafish. She plans to continue in her efforts with these research studies.

Magaly Quinteros is a recent graduate with a bachelor's degree in anthropology. She recently entered the University of California medical sector with the goal to attain experience with working with marginalized populations. During this gap year, her hope is to attain medical insight and experience to better understand the health problems that marginalized individuals face on a regular basis. Her long-term goal is to become a social worker and later use her skills and knowledge to be influential within the global health sector.

Roxzel Soto Tellez is a sociology undergraduate student at Chico State. She is an advocate for youth in foster care and a social activist. Her research seeks the causes that shape attitudes by using survey data to examine the effects of these factors. Specifically, Roxzel centers on political, racial, ethnic, gender identities, and social influences contributing to perception. She is currently researching the effects of demographics, social influence, and political ideas of Santa Ana residents on their perception of the police. In short, Roxzel studies the impacts that the social environment has on perceptions.



Vicky Wong is a first-generation Chinese American college graduate from Chico State, where she majored in both child development and psychology. She is an early childhood educator. Her research interests include the cultural factors affecting adolescent well-being, school violence prevention and safety, parent-child relationships with a focus in parentification, and peer relations in a school setting. Having worked to serve young students from all diverse populations has led Vicky to pursue a master's degree in school counseling. She hopes to become a high school counselor and advocate for youth, especially students of color.

Tatiana Ybarra is an undergraduate majoring in political scienceand criminal justice at Chico State. She is an Indigenous motherof three boys, wanting to incorporate research ways into her reservation lifestyle in Nevada. Her future goal is to become a district attorney and published indigenous research scholar.

Graduate Students

Alondra Adame is a graduate of the Master of English program at Chico State. They are a Chicanx essayist, poet, and educator. 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.

Vania Buck is a graduate student in the Master of Social Work program at Chico State. Her research interests include child welfare, its policies, and practices. Bilingual in English and Spanish, Vania's research focuses on the experiences of bilingual social workers in child welfare and how the skill impacts services to Spanish-speaking only communities. She hopes to add to the limited research pertaining to bilingual social workers in child welfare by continuing her research in a PhD program. Additionally, Vania wishes to create university educational programs to support bilingual students with the goal to better prepare them as they transition to bilingual professionals.

Sheila Mary Burke is a graduate student in the Communication Studies Department at Chico State. Her primary areas of study are organizational communication and change management. She is passionate about stakeholder engagement and motivating individuals and groups to bring about meaningful change. Her research is centered on stakeholder and community voicing in matters of public interest. With an extensive background in leadership and corporate communication, she hopes to combine her study and experience to teach organizational communication.

Cara Campbell is a graduate of the Master of Social Work program at Chico State. She is a first-generation college student, advocate for women of color, and a cycling enthusiast. Her motivation is to contribute to the research in health and maternal care for women, with an emphasis on Black women, where it is sorely needed. Her aspirations are to assist communities and healthcare professionals with improving medical and maternal health care for Black women with hopes to decrease racial health disparities.

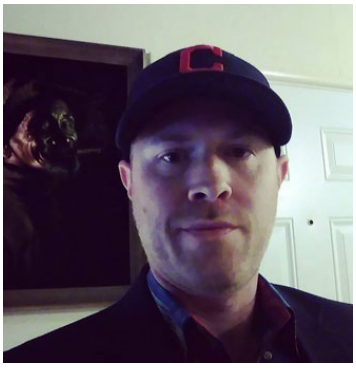
Alaina Castor is a graduate student in the psychological science master's program at Chico State. She is interested in research that aims to foster student equity and achievement within higher education. In the past, she has worked on several research projects that focus on this mission. As a Latinx and first-generation college student herself, Alaina intends to continue advocating for students through her work. It is her hope to shed light on how to best support underrepresented student groups on their academic journeys in an effort to bridge the achievement gap.

Blake Ellis is a graduate of the Master of Social Work program at Chico State. She served individuals impacted by the 2018 Camp Fire as an AmeriCorps disaster case manager and recently became a certified Forest Therapy Guide with the Association of Nature and Forest Therapy. She plans to continue to study solastalgia and ecological grief and integrate her research into disaster recovery and mitigation programs. Blake hopes to take an ecological approach to social work that honors human beings' relationship to the natural world in order to build resilient, sustainable, and healthy communities.

Emilee Hunt is a graduate student in the Master of Social Work program at Chico State. Her previous research has centered LGBTQ+ individuals, including survivors of sexual assault and veterans serving prior to the repeal of Don't Ask Don't Tell. As a prospective school counselor, she is particularly interested in research that focuses on the social-emotional growth and well-being of K–12 students experiencing multiple marginalizations. Her goal as a counselor and researcher is to support underserved students in the development of knowledge surrounding mental health coping tools and behavioral interventions through evidence-based practices.

Giang Hang is a cellular and molecular biology graduate student attending Chico State. With interests in the medical and psychology field, Hang took particular interest in the impacts of remote learning on the mental health of students, and the correlation between declining mental health and academic success. Giang is looking forward to continuing her work with Nate Milliard and the research team before pursuing a doctorate in clinical psychology or a medical degree with a focus in child psychiatry.

Jaime Lopez is a master's student in the biological sciences program at Chico State. He obtained his bachelor's degree in biology with a focus on ecology and environmental biology from CSU Dominguez Hills in 2016. Jaime's research interest lies in trying to explain the role of diazotrophs and understand how their presence affects coral symbiosis under environmental changes. A tropical sea anemone, *Exaiptasia pallida*, is used as a model system for understanding coral symbiosis and bleaching. He hopes to continue studying coral symbiosis and someday build conservational strategies to aid our beloved coral reefs.



Dana Moot II is a 2021 graduate of the Master of Art program at Chico State. He is an Air Force veteran, epigrapher, researcher, graphic designer, and illustrator. His research interests include the arts and languages of the Americas in general, with specific interests in the writing systems of ancient Mesoamerica, especially the Maya Hieroglyphic script. He hopes to continue his research pursuits in a PhD program as well as to continue his ongoing work as an illustrator, specializing in ancient artifacts.

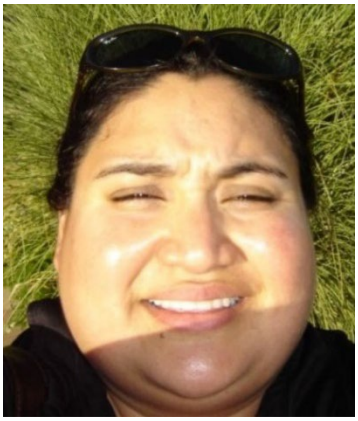
LuAnn Peitz currently lives in Chico with her husband and three daughters. Born and raised in Trinity County, she has always had a deep-seeded passion for the community that reared her. Her master's thesis was a work of passion that has attempted to give a voice to her community. She is building on her thesis work by creating a North State Youth Collaborative (NSYC). The NYSC will give young people across the North State a voice in local, regional, and state policy and initiatives. She aspires to be a macro social worker that can be a voice for the oppressed rural communities throughout the North State.

Kaitlyn Romo received her Master of Biological Sciences from Chico State in 2021. She also received her bachelor's degree in cellular and molecular biology from Chico State in 2016. Her lifelong interests in biology and environmental studies, along with a career exploration in wine microbiology, led her to the study of cnidarians and their microbiome, utilizing the model organism Aiptasia. She is currently a Quality Control Supervisor at Crain Walnut Shelling in Los Molinos. Her goals include inspiring others to pursue scientific fields and continuing her love for education through educating others.

Meegan Sims graduated from Chico State in May 2021 with a Master of Arts in Anthropology with an option in museum studies. Prior to attending Chico State, she received a bachelor's degree in creative writing from BYU-Idaho. Currently, she is in the process of applying for jobs in the museum field. In the meantime, she is working on finishing and polishing her first novel for eventual publication.

Travis Souders is a graduate student in the Communication Studies program and a graduate of the journalism program, both at Chico State. He is a writer, journalist, educator, and communication professional. His research interests include interdisciplinary approaches to communication, particularly in the fields of journalism and mass media; specifically, he is interested in intertwining communicative and sociological concepts to find ways to generate more equity and inclusiveness in journalistic areas. He hopes to contribute to the development of a reinvigorated, community-minded generation of journalists, and to produce a book that reimagines equitable sports journalism.

Amanda Taylor received her Master of Social Science in spring 2021. She is the credential advisor for Chico State. After seeing the negative effects on students who transitioned to online during spring 2020, Amanda aimed her research to assisting students on managing their stress. Her research focuses on the capability of positive thinking techniques such as breathing, self-care, and positive self-talk. She hopes to continue to implement her research on positive thinking into her current position as an advisor and maybe one day into her own class.



Kathy Vargas is a graduate of the Master of Social Science at Chico State. She has worked as staff on campus since 2012 in three campus divisions. As an alumni and ambassador of the Hispanic Scholarship Fund and the Gates Millennium Scholars Program, her experiences on campus motivated her to complete a master's degree that focused on racism at Chico State and the inability to attain equity without addressing racism outright.

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.

Jennifer White is a recent graduate with a master's degree in nutrition education from Chico State. Jennifer previously acquired her bachelor's degree at Chico State, majoring in nutrition and food science with the option in general dietetics. Her goal after becoming a registered dietitian is to continue her research of diversity within nutrition programs and the profession. Other research interest includes community nutrition, food security and food access policy, as well as clinical research focusing specifically on the gut and microbiome.

Meet Our Faculty Mentors

Faculty

Professor Nathan L. Anderson is an assistant professor in the Department of Mechanical and Mechatronic Engineering and Advanced Manufacturing at Chico State. He engages in multiple research projects spanning computational materials science to educational pedagogy. Prior to joining academia, he worked in the semiconductor manufacturing industry for KLA Corporation. Before industry, he spent time at Sandia National Laboratories. He earned his PhD in materials science and engineering from Purdue University and his BS in materials engineering from San Jose State University.

Professor Rob Davidson teaches creative writing and Americanliterature at Chico State. His most recent book is *What Some Would Call Lies: Novellas* (Five Oaks, 2018), a finalist for the 2018-2019 *Reader Views* short story/novella prize, and praised by *Kirkus Reviews* as "A pair of tales that will entertain, transport, and move readers." He is the author of three previous short fiction collections: *Spectators: Flash Fictions* (Five Oaks, 2017); *The Farther Shore* (Bear Star, 2012); and *Field Observations* (University of Missouri, 2001). His honors include a Fulbright award, multiple Pushcart Prize nominations, and an AWP Intro Journals Project Award in fiction.

Professor Keiko Goto is originally from Japan. She was born inGunma Prefecture, which is famous for hot springs and tough women. She holds a BS 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. She enjoys traveling, pairing wine with foods, and playing piano, clarinet, and cello.

Shelley R. Hart is an associate professor in the Department of Child Development at Chico State, a research associate in the Department of Mental Health, Bloomberg School of Public Health at the Johns Hopkins University; and a nationally certified school psychologist. Her scholarship has focused primarily on mood disorders and suicide in school-aged children. Her most recent work focuses on qualitative research regarding the mental health experiences of ethnic minority youth in Butte County. To date, Hart has authored over 50 publications and has over 75 presentations at local, regional, and national conferences.

Lauren McNamara is a Registered Dietitian and an assistant professor in the Department of Nutrition and Food Science at Chico State. She is also the Director of the Dietetic Internship, helping to provide interns with varied and challenging supervised learning opportunities. McNamara has worked as a clinical dietitian doing both inpatient and outpatient counseling since 2014. Her research interests include clinical and community nutrition, disordered eating, curriculum development, and action research related to program implementation and improvement. McNamara enjoys spending time with her family, running, skiing, hiking, biking, and, of course, cooking and eating delicious food!

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 BS in psychology from the University of Florida, an MA in applied behavioral science from the University of Kansas, and a PhD in psychology from Utah State University; and 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 Celeste Jones teaches undergraduate and graduate social work micro practice, focusing on mental health and trauma. She is a trained MI instructor and MINT member. She has extensive clinical experience with individuals, families, and children. Jones researched trauma debriefing with bank robbery victims and has experience debriefing individuals and communities that have experienced trauma through natural disasters (floods), technological disasters (Oklahoma City bombing), workplace trauma (bank robberies), and interpersonal trauma (domestic violence). Jones' research interests are trauma and recovery, domestic violence, international social work issues, digital storytelling, telehealth, and social work education.

Professor Linda Kline has worked at Chico State since 1990. She received her PhD in environmental psychology from Colorado State University in 1984. Kline actively involves students in research knowing that each project is better with the input and efforts of persons with varied backgrounds and perspectives. Her effort to understand challenges of first-generation college students and to take action to remove equity gaps in graduation rates created a perfect connection with her student mentee.Kline is also active in investigating components of human- animal interaction.

Seth Selorm Klobodu is an assistant professor in the Department of Nutrition and Food Science at Chico State. His research interests are diversity and inequality in nutrition and dietetics education (e.g. barriers to nutrition and dietetics education, weight stigma and bias, etc.), food insecurity among college students, and native and indigenous food cultures.

Professor Stephen Lewis was hired by Chico State in 1998 and teaches Latin American history classes. He has published on the Mexican Revolution, state and nation building in the state of Chiapas, and the history of Mexican *indigenismo*. Currently, he is completing a classroom textbook on Mexico's lesser-known or "unscripted" revolutions since 1958.

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.

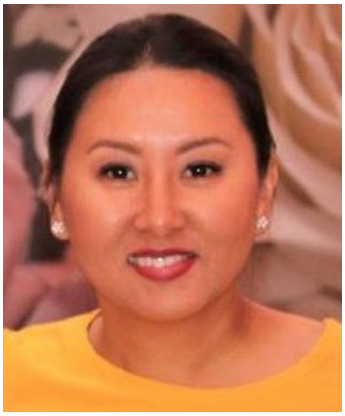
Professor Ana Medic came to Chico in 2012 from Serbia. Her education includes a BS in biology and an MS in ecology and environmental protection from the University of Belgrade. Medic obtained her second professional science master's degree at Chico State with emphasis on sustainable water and wastewater treatment. She worked as an educator for over 12 years teaching as science and biology teacher the Cambridge Britannica International School and the International Baccalaureate program. Medic discovered she truly enjoyed teaching and sharing her passion for science with international students and continued her teaching career at Chico State. Her research includes solid waste management, water management, weed management in agriculture with IPM implementation. She likes traveling and is fluent in English, Spanish and Serbian.

Professor Vincent Ornelas earned his bachelor's degree at Pitzer College and went on to the University of Southern California to earn both his MSW and his PhD. Ornelas was trained as a qualitative methodologist and has published articles on various issues linked to the Latinx population in the United States. He iscurrently researching recruitment and the success of community college students at Chico State. Ornelas complements his research with teaching and administering the BSW program at the School of Social Work and service on campus with the Chican@/Latin@ Council and the California Faculty Association as well as involvement in his Chapman neighborhood.

Susan Roll is a professor and director of the School of Social Work. She received her MSW from Arizona State University and her PhD in Social Work from University of Denver. Roll's teaching and research interests focus on poverty and income inequality. She studies how social welfare policies either support or create barriers for families to be financially stable. She also works on how we teach and learn about poverty through innovative pedagogy and experiential learning.

David Stachura is an associate professor in the Department of Biological Sciences at Chico State. He utilizes zebrafish (*Danio rerio*) to understand the evolution of the vertebrate immune system. He is a scientific consultant for Finless Foods, a Bay Area company focused on making sushi from fish stem cells. He is also the Chief Scientific Officer at FACTORFIVE, a local company designing stem-cell based treatments for skin conditions.

Cawa Tran is an assistant professor of biological sciences at Chico State. Tran received her bachelor's degree in integrative biology from the University of California, Berkeley in 2004, and her PhD from the University of Hawaii at Manoa in 2012. She pursued postdoctoral research at Stanford University School of Medicine until she joined Chico State in 2017. Tran and her students are interested in the molecular and cellular mechanisms mediating symbiosis. They use an integrative approach to investigate host-microbe interactions in the sea anemone Aiptasia, a laboratory model for understanding coral symbiosis and bleaching.



Professor TangJudy ("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. Vang has served on several graduate thesis committees and is currently mentoring two graduate students on their research projects pertaining to race and its impact in academia and social services.

Heather Werner has a bachelor's degree in child development, master's degree in social work with an emphasis in child welfare (Title IV-E). Prior to teaching, Werner worked for nine years as an adoptions specialist for the California Department of Social Services, Adoptions Bureau. She hopes to use her research, teaching, and mentorship experience to promote her mentee's acceptance to a PhD program in the future.

Professor Jennifer Wilking is the Political Science and Criminal Justice Department associate chair and received her PhD in political science from UC Davis in 2010. She studies and teaches in the field of comparative politics, specializing in developmentand China. Other interests include research design, local housingissues, and collaborative teaching and learning.

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

Check with your department or favorite professors; also consider the following:

- Student-Faculty Research Collaborative
- Annual Student Research Competition
- Student Awards for Research and Creativity
- Adelante Summer Researchers Program
- Chico STEM Connections Collaborative (CSC^2) 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

Go to the Adelante Electronic Journal to link to all of the resources above:
https://www.csuchico.edu/adelante/researchers-program/adelante-electronic-journal.shtml

Appendix B

Submissions

Photo Source: 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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Twitter: @*AdelanteChico*

More information is also available at the Office of Graduate Studies: graduatestudies@csuchico.edu.