



The UTPB Journal of Undergraduate Research

Established 2018

Volume 5

October 2023

Editors-in-Chief

Dr. Rebecca Babcock (Arts, Humanities, and Social Sciences)

Dr. Mohamed K Zobaa (Natural and Physical Sciences)

Editorial Board

Dr. Imane Hijal-Moghrabi (Social Sciences)

Dr. Qingwen Hu (Mathematics)

Mrs. Irene Perry (Biology)

Technical Editor

Candice Harding

Student Associate Editors

Clayton Baumgartner (Arts, Humanities, and Social Science)

Mariah Gomez (Arts, Humanities, and Social Science)

Mirta Ramirez-Espinola (Arts, Humanities, and Social Science)

Prakash Madai (Sciences and Engineering)

Madan Baduwal (Sciences and Engineering)



A wrong unredressed: The culture of honor in the setting of “The Cask of Amontillado”

Jacquelyn Fansler^{1,S,§}, Clark Mooreland^{1,M}

1. Department of English, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: fansler_j48151@utpb.edu

ABSTRACT

The Cask of Amontillado is one of Edgar Allan Poe's most well-known stories. To address the slight against him, our main character, Montessor, lures his victim, Fortunato, into the catacombs to exact retribution in the form of an honor killing. The method of honor killing that Poe chose breaks the cultural norms and conventions of the time and raises essential questions. Why did Poe undermine, manipulate, and even transform the social and cultural rules and norms of honor killing? Did Poe deliberately bend the gender norms through the selected mode of murder and inject irony in his take on honor killing by using dishonor as his preferred weapon? I answer these questions by exploring why Poe chose to publish in *Godey's Ladies Book* and research the historical evidence and significance of female honor killing. Additionally, I examine the writings of Poe's peer authors to reveal potential influences on Poe. I read Poe's correspondence in *The Collected Letters of Edgar Allan Poe*, papers, and diaries/journals to understand the impact and mindset of Poe, as well as explore the genre conventions of honor killing through scholarly research and explore the underlying psyche of Poe to reveal the reasoning behind the artistic choices he made. I engage in academic research of the history, conventional modes, and gender roles of honor killings to understand the full scope of Poe's rejection of and departure from those norms.

The Oxford English Dictionary defines honor as "Great respect, esteem, or reverence received, gained, or enjoyed by a person or thing; ... reputation, good name." Social status in current times is less valuable than in the past. While individuals prefer not to be social pariahs, they rarely feel that their entire reputation depends on how others view them; however, if we venture back in time, even a few hundred years, we find that the concept of honor was a much more serious construct. Honor, or lack of it, could make or break an individual's social standing and even that of one's entire family for generations to come. Would you kill for a slight against your honor? Montresor would. Montresor did. In a time and place when honor culture was prevalent, was murder too far to go -- or was it the perfect response? Edgar Allan Poe's "The Cask of Amontillado" reveals Montresor's adherence to the honor culture of the time that demanded retribution for insult and demonstrates Poe's use of his art as a form of catharsis.

In the nineteenth century and long before, honor was a significant social construct of great cultural importance. During these times, one slight against an individual or their family could and often would mark it as blemished for time unknown. In "The Death of Dueling," Wade Ellett discusses the history of the duel, beginning with the uncertain origins and culminating in an altered society that no longer valued bloodshed for preserving honor above the new abhorrence of violence. Ellett discusses the romanticization of the duel and the singularity that set it apart from "wartime violence and barroom brawls," stating, "dueling placed two opponents, almost always of similar social class, against one another in a highly stylized form of combat." Ellet further explains the differences between wartime violence and barroom brawls in contrast to duels, writing, "Neither followed the rigid formalities dueling demanded ... [it] was a unique form of violence, its origins found only in the upper echelons of society." Ellet discusses the evolution of civilization into one adequate at dispensing justice, yet dueling was reserved "as

a means to dispute matters of honor" (59). According to Ellett, the "duel of honor" is traceable to medieval times and the ideals of chivalry, honor, and virtue. These ideals eventually morphed into a code of honor that served the upper class in their highly regarded standards of gentlemanly behavior and courtesy (60). Additionally, and potentially most importantly, it is revealed that duels were strictly reserved for matters of honor, asserting that "only gentlemen could challenge each other to a duel" (61). Ellet's detailed history of and the rules that dictated proper etiquette for dueling are illuminating to Poe's "The Cask of Amontillado."

Most compelling is the history of a duel at Castle Island, where Poe happened to spend time while in the Army. According to Quintus Curtius in an article titled "Edgar Allan Poe's Sinister Interpretation For 'The Cask of Amontillado,'" Poe drew inspiration for his writing from a mixture of life events and imagination. While exploring the burial site on Castle Island, Poe discovered the history of a duel that took place between two officers on the grounds in 1817. Gustavus Drane, who had already killed many times in duels, initiated the duel with Robert Massie, a favorite among the men; unfortunately, Drane overtook Massie and was subsequently buried on the grounds. Curtius notes this is where reality and legend begin to blur, as he states, "According to legend, Drane vanished soon after this and was never seen again; his fellow officers had supposedly abducted him and walled him up alive in the fort." The reality is that Drane lived until 1846, but not all of this legend appears to be without merit. In 1905, Curtius claims workers discovered a hidden walled-up section of the Fort with a skeleton inside, shackled to the ground and wearing the vestiges of an Army uniform. Though the soldier's identity is unknown, it lends credence to the tales Poe heard about during his time at the Fort and undoubtedly influenced his creative genius when writing "The Cask of Amontillado."

One often thinks of dueling as a European tradition; however, the prevalence of dueling in America was significant, notably because dueling continued in America long after it was outlawed and eradicated in England. In an article titled "Personal Honor and Dueling in the Early United States" on the Norfolk Towne Assembly website, the anonymous author discusses the duel that killed Alexander Hamilton at the hands of Vice President Aaron Burr in 1804. The article further states that the "duel of honor" began circa 1500, and though it started to decline in the early nineteenth century, duels of honor took place in some locations until the First World War. The author argues that though today's society might find it challenging to comprehend dueling over a mere insult, it is essential to understand the climate of society in Early America during the time that supported and informed these decisions. Dueling, reserved only for gentlemen and slights of honor, was focused on the highly fundamental ideals of "Personal integrity, bravery, and the importance of one's reputation [which] dominated the psyche of the gentlemen of Early America" (Personal Honor). This, coupled with the fact that men often dueled to defend the honor of women who could not protect themselves, creates a vivid picture of the driving force of chivalry and honor in Early America. These ideals undoubtedly influenced Poe, as this was his time in America.

Understanding the backdrop of society and the code of honor during Poe's time sheds clarifying light on his narrative decisions in writing "The Cask of Amontillado." Defending one's honor, or those of the family, was paramount and was achieved in many ways. While the courts handled crimes against a person, such as theft or vandalism, the crime of insult was left unpunished. The culture of honor demanded an answer, a retaliation to right the wrongs committed against an individual. One way society addressed this was by challenging an individual to a duel. Though outlawed in most of the world by the nineteenth century, duels still took place, usually under cover of early dawn. While duels were unlawful, they were still

governed by an understood set of rules and expected conduct. These rules dictated the types of weapons permitted, how many paces to take, and even the rule of seconds (the person that would be there as backup). The Code Duello dictated these rules, the official set of codes and rules for dueling that, according to James T. Moore, flourished for nearly a century before eventually dying out in the post-Civil War era (259). One of the unspoken but well-understood rules was that duels were reserved solely for the aristocratic and upper-class members of society. Therefore, an upper-class member should not challenge a lower-class member to a duel.

The duel was a very effective way to defend one's honor, and although it was essentially illegal at the time, word still spread, and society knew honor was protected and restored. For men of the nineteenth century, the willingness and ability to defend oneself regarding both verbal and physical assaults defined masculine honor (Spierenburg). "The Cask of Amontillado" introduces two characters, Montresor and Fortunato. Montresor conveys a story of insult and injury bestowed upon him at the hands of Fortunato: slights egregious enough in Montresor's eyes to merit and even demand honor-bound retribution.

As the story begins, Montresor reveals his wounded pride and justifies his motive by stating, "The thousand injuries of Fortunato I had borne as I best could, but when he ventured upon insult, I vowed revenge." Although Montresor never explicitly states what injuries or insults Fortunato has inflicted upon him, he gives the impression that the insult is significant enough to demand retribution. While it is difficult to conceive of an insult sufficient to demand murderous retribution, it is imperative to remember the time and culture this tale depicts. Spierenburg states, "... honor and its defense were practically the same for men." Montresor embodies this idea: "I must not punish, but punish with impunity. A wrong is unredressed when retribution overtakes its redresser." In declaring this, Montresor is not

only defining his sense of honor but also stating that a critical component of honor means that if he is caught and punished for the retribution he bestows on Fortunato, the retribution will be incomplete and honor unrestored. Montresor continues, saying, "It is equally unredressed when the avenger fails to make himself felt as such to him who has done the wrong" (733). Montresor leads Fortunato below ground into the family catacombs, shackles him to the wall, and walls him in a while, taunting his cries and pleas, forever entombing him below the earth (736-738). By luring Fortunato underground, Montresor has lessened the likelihood of being caught and punished for his crime. In contrast, he shackles him to the wall and entombs him, ensuring that he clarifies to Fortunato that this is no mistake -- he is avenging his honor. By executing his carefully laid plans, he has met his previously stated requirements for honor retribution.

Montresor gives evidence of a long-established family line in "The Cask of Amontillado." While walking down into the catacombs, Montresor claims the Montresor's were "a great and numerous family" and goes on in the conversation to inform Fortunato of his family crest, "A huge human foot d'or, in a field of azure; the foot crushes a serpent rampant whose fangs are imbedded in the heel." Montresor shares one more piece of familial information with Fortunato. Montresor states that his family motto is "Nemo me impugn lacessit," which translates from Latin into English as "No one provokes me with impunity" (735). This, paired with the previous information, is a thinly veiled threat. Existing within a culture of honor demands that a wrong be addressed and made right. The fact that Montresor comes from a well-established family of noble blood provides much explanation for the justification of retribution. While Montresor does state that he overlooked many slights initially, he reaches a point where he no longer feels he can ignore the insults heaped upon him by Fortunato (733). Arguably, Montresor is simply a man who has been wronged one too many times, his ego and

pride wounded to the point that he feels he must seek revenge on the one who has slighted him so wholly and deeply. Montresor is honor-bound by cultural expectations to address the insult leveled against him by Fortunato.

The dilemma that Montresor faces in "The Cask of Amontillado" is one fraught with the struggle of murder, as well as the ethics of maintaining honor within the current culture that demands its defense. While ethics of the nineteenth century frowned upon murder and even convicted individuals for this crime, the prevalent honor culture impressed upon society is vital to consider. In "Honor Killings and the Cultural Defense," John Alan Cohen states, "For many years in the United States, honor was so important that men felt it was imperative to retaliate against someone who had impugned their honor" (13). Cohen further explains that dueling was a means with which to address the perceived insults to a man's honor and addresses the legal issues surrounding dueling, stating, "Even after anti-dueling statutes were enacted in the Nineteenth Century, public sentiment made it rare to convict a man of killing another in a duel because jurors still regarded dueling as an appropriate response to insults, slander, and libel" (14). Montresor does not formally challenge Fortunato to a duel, and it is essential to consider why, as well as question if the outcome of the story was a metaphorical duel.

Regarding Montresor challenging Fortunato to a duel, it is unclear whether it would have been acceptable based on their social hierarchy. Though one can intuit from the text that Montresor comes from a long-established aristocratic family, Poe did not clarify if Fortunato is of the same class. Montresor remarks, "...he was a man to be respected and even feared," which hints that Fortunato belongs to a higher class; however, the precise class to which Fortunato belongs, in contrast to Montresor, is not more explicitly stated within the text (733). If they are of the same class, one can presume that Montresor did not challenge

Fortunato to a duel because it was imperative that Montresor not be caught and punished for his crime against Fortunato to satisfy his terms of punishment. It is important to note, however, that Montresor wears a rapier, a standard weapon allowed in the confrontation of a duel (737). The verbal parrying between Montresor and Fortunato is a metaphorical duel that climaxes with Montresor emerging as the victor when he succeeds at entombing Fortunato. However, an important question remains: If this was a metaphorical duel, why was it conducted in complete secrecy?

In seeking an understanding of the motivations of Poe and his literary choices, it is vital to examine his life and the traumas that informed his art. Poe was born in 1809 to David and Eliza Poe. His father abandoned the family and left this mother alone to raise their three children. Poe's mother contracted tuberculosis and died when Poe was two years old. John and Frances Allan took Poe in but did not formally adopt him. Poe had an incredibly strained relationship with his John Allan that culminated in John Allan permanently severing ties with him; however, he maintained a very close and loving relationship with Frances Allan until her death from a long and unnamed illness. Poe spent time with his aunt, Maria ("Muddy") Clemm, and later married his cousin, Virginia ("Sissy") Clemm. Virginia Clemm eventually died from tuberculosis after a prolonged and challenging battle with the disease. By all accounts, Poe never fully recovered from the loss of his wife and maintained a very close relationship with her mother, "Muddy," until he died in 1849 ("Poe Biography"). While it is unlikely that Poe remembered his mother or her death, he was aware of her loss as he sought to find a "Ma," using that affectionate term with Frances Allan and various women throughout his formative years (Silverman 26).

Consequently, enduring the multiple traumas of his life, Poe was undoubtedly affected and bore lasting psychological scars. Poe's repeated losses of family members to illness, particularly

tuberculosis and lung illnesses, seemingly left its mark. Death from tuberculosis is particularly horrific to experience and witness. The afflicted individual must suffer, physically trapped in a struggle, unable to escape or find relief from the slow and crushing suffocation as they gasp and fight for each breath until death, agonizingly long in coming, frees them from their struggle. Helpless to relieve this horrific pain and terror, the caregiver and family must watch as their loved one fights for life in vain and longs for release in death. Having witnessed the decline that Poe knew would lead to his wife's death and keenly aware of it in memoriam, Poe was haunted by and helpless to heal his mother and others he had loved. Poe took to the pen to find release from the pain. In an article titled "Narrating Pain: The Power of Catharsis," Richard Kearney discusses the use of narrative as catharsis and the power of recreating the past to find healing for trauma, perceptively stating, "One of the most enduring functions of narrative is catharsis ... recounting of experience through the formal medium of plot, fiction or spectacle permits us to repeat the past forward" (51). Kearney goes on to explain the idea of retelling history and the vital release it provides is further expanded on through the example of holocaust survivors, stating,

Thus, stories become cathartic to the extent that they combine empathic imagination with a certain acknowledgment of the cause and context of the suffering, offering a wider lens to review one's insufferable pain. The degree of detachment afforded by the narrative representation may be small indeed, but without it one would be smothered by the trauma to the point of numbness ... one risks succumbing to the sheer overwhelmingness of horror. (61)

Given the evidence and the recurring themes throughout Poe's work, it is a foregone conclusion that he was searching for release and a retelling of the past within the present. There are several examples of Poe revisiting the idea of entombment, suffocation, and being buried alive

in many of his stories. To name a few, "The Black Cat," "The Premature Burial," "Loss of Breath," and "The Cask of Amontillado." Poe was seeking release from the pain of his loved ones dying painful and suffocating deaths by re-writing the narratives of their passing and seeking a resolution and retribution for their dishonorable demise. One of the most convincing aspects of "The Cask of Amontillado" being representative of honor retribution is the hint of gender-bending that takes place through the character of Montresor.

While not as prominent as men in the nineteenth century and less represented in history, women did commit murder when Poe wrote "The Cask of Amontillado" and for many years before. In "Female Poisoners of the Nineteenth Century: A Study of Gender Bias in the Application of the Law," Randa Helfield discusses the disproportionate use of poison by women killers in contrast to men and the motivating reasons behind that choice. Helfield discusses the murders by women, the prominence of those taking place within the domestic setting, and the privacy of that situation and its effect on being discovered (57). Further expanding on this idea, Helfield contends that "... poisoning by its very nature is a crime of secrecy. The poison was often administered in the privacy of the home to a victim intimately known to the poisoner and as such, least likely to be suspicious" (58). In addition, Helfield argues that choosing poison was intentional because they were readily available and convenient, as well as asserting that "... its use as a murder weapon required little effort or physical strength," highlighting the appeal of poison as a murder weapon for women (59).

Though particular forms of honor retribution were socially acceptable for men to commit, such as duels, this was not the case for women. If women must enact revenge of the murderous sort, operating under complete secrecy and concealment was imperative. Utilizing the privacy of a home, the cover of darkness, or a

loud distraction would be ideal in this situation. The setting of "The Cask of Amontillado" meets these requirements. Poe did not select poison as the murder weapon to kill Fortunato, yet Montresor notably encouraged Fortunato to drink the allusory wine as he led him to his tomb. While it is apparent that the wine was not drugged, since Montresor drank it with Fortunato, Montresor utilized it to disorient Fortunato and render him less likely and able to resist his fate at the hands of Montresor (735-737). The use of the wine to disorient and quiet the victim alludes to a woman being the perpetrator of the crime.

Of particular importance to address is the nagging question of why, if this was a metaphorical duel, it was pursued and brought to completion in secrecy. The answer to this question becomes evident when analyzed through the lens of Montresor, serving as a metaphor for the women in Poe's life who died horrifying and torturous deaths. Montresor was the narrative representation of these women. As a developed character, Montresor's story consists of narrative choices made by Poe to drive and fulfill the plot while operating as a metaphor for the ill-fortuned women in Poe's life. On the other hand, Fortunato was a metaphorical tool utilized to represent these women's illnesses and traumatizing deaths. In utilizing the symbolic duel in this story, Poe introduces us to honor retribution enacted by his loved ones against their illnesses and deaths. This conclusion supports the choices Poe made surrounding the duel, such as the secrecy, the lack of a formal challenge, the neglect of the formal rules of duels, the culmination in darkness, and the subversion surrounding the duel. The reasoning is evident through Montresor's metaphorical identity as a woman and Fortunato's as illness and death. With few exceptions, a woman enacting a duel was unacceptable, so the apparent lack of adherence to the honorable rules of the duel, the abandonment of well-accepted standards, etc., would have been abandoned to support the required secrecy and darkness that women must

operate under to conceal their crimes. The actual duel is enacted and carried out through the metaphorical tools utilized by Poe in this story: Montresor (the women in Poe's life) enacts and completes honor retribution on Fortunato (illness and death) through the completion of his physical entrapment and suffocating death, which is suggestive of the inescapable and debilitating suffocation deaths due to lung disease suffered by his loved ones. In this successful completion, Poe allowed his loved ones to regain their honor from dishonorable deaths.

Poe was wronged by a series of cruel and traumatic losses and rejections. In losing his mother and adoptive mother and his wife's impending death to horrific illnesses, Poe, stricken with melancholy and grief, sought relief through narrative. As Poe fought to find solace and release from this pain, he revisited the horrific deaths of his loved ones through fiction. "The Cask of Amontillado" saw Poe utilize the character of Montresor as a disguised proxy for the women in his life who died horrific, cruel, and dishonorable deaths at the hands of unstoppable, incurable, and vicious diseases. Montresor is disguised in a black mask and roquelaire while befitted with a classic dueling weapon to represent the justice of honor (734-737). Notably, the black mask serves as a disguise that further hides Montresor's identity as the metaphorical woman. Poe bent the

gender of Montresor to use his character as a metaphor for the women in his life who suffered horrific, diminishing, humiliating, underserved, and dishonorable deaths.

Poe allowed Montresor to represent a woman covering her tracks, using a disorienting/drugged substance to weaken her victim, and finally enacting honor retribution through suffocation, representing a slow, painful, gasping death due to lung disease. Poe used Montresor to right what he saw as a wrong perpetrated against his loved ones by giving them a narrative voice and an opportunity to reclaim their honor. In doing so, Poe sought catharsis and a release from the haunting deaths of those he loved most.

"The Cask of Amontillado" has been read and interpreted in many ways, and the one absolute is that Poe's true intentions and motivations can never be known. Following close reading and research into Poe's life, it is logical to conclude that he was scarred and traumatized by his tumultuous life and the losses he experienced. Montresor represents not only the classic duel and consequent reclaiming of honor but also the women in Poe's life who suffered horrific deaths. Fortunato's death by suffocation after being entombed underground represents the slow and agonizing suffocation deaths of Poe's loved ones. It allows Poe catharsis through the reclamation of honor and retribution against the deaths that haunted him the most.

Works Cited

- Cohen, John Alan. "Honor Killings and the Cultural Defense." *California Western International Law Journal*. n.d., vol. 40, no. 2, Spring 2010, pp. 177-252, <https://scholarlycommons.law.cwsl.edu/cgi/viewcontent.cgi?article=1086&context=cwilj>. PDF. Accessed 17 June 2021.
- Curtius, Quintus. "Edgar Allan Poe's Sinister Inspiration for 'The Cask of Amontillado.'" *Fortress of the Mind*, 2017, <https://qcurtius.com/2017/06/30/edgar-allan-poses-sinister-inspiration-forthe-cask-of-amontillado>. Accessed 24 Aug. 2023.
- Ellett, Wade. "The Death of Dueling." *Historia*, vol. 13, 2004, pp. 59–67. Eastern Illinois University, <https://www.eiu.edu/historia/Ellett.pdf>.

- Fansler, Jacquelyn. "A Wrong Unredressed: The Culture of Honor in the Setting of 'The Cask of Amontillado. [Power Point Slides]. University of Texas of the Permian Basin College of Arts and Sciences. Undergraduate Research Day. Odessa, TX. 04 April 2023.
- Helfield, Randa. "Female Poisoners of the Nineteenth Century: A Study of Gender Bias in the Application of the Law." *Osgoode Hall Law Journal*, vol. 28, no. 1, 1990, pp. 53-101. Osgood Digital Commons, <https://digitalcommons.osgoode.yorku.ca/ohlj/vol28/iss1/2>.
- "honour | honor, n." *Oxford English Dictionary*, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/4561664648>
- Kearney, Richard. "Narrating Pain: The Power of Catharsis." *Trauma, Therapy, and Representation*, vol. 30, no. 1, 2007, pp. 51–66. JSTOR, <http://www.jstor.org/stable/43152699>
- Moore, James T. "The Death of the Duel: The Code Duello in Readjuster Virginia, 1879-1883." *The Virginia Magazine of History and Biography*, vol. 83, no.3, 1975. pp. 259-76. JSTOR, www.jstor.org/stable/4247961
- "Personal Honor and Dueling in the Early United States." Norfolk Towne Assembly, 03 December 2021. <https://www.norfolktowneassembly.org/post/personalhonor-and-dueling-in-the-early-united-states>
- "Poe Biography." The Poe Museum. <https://poemuseum.org/poe-biography/>. Accessed 17 October 2022.
- Poe, Edgar Allan. "The Black Cat." *Edgar Allan Poe Complete Tales and Poems*, Fall River, 2006, pp. 531–538.
- . "The Cask of Amontillado." *Edgar Allan Poe Complete Tales and Poems*, Fall River, 2006, pp. 733–738.
- . "Loss of Breath." *Edgar Allan Poe Complete Tales and Poems*. Fall River, 2006, pp. 127–136.
- . "The Premature Burial." *Edgar Allan Poe Complete Tales and Poems*, Fall River, 2006, pp. 587–597.
- Silverman, Kenneth. *Edgar Allan Poe A Biography: Mournful and Never-ending Remembrance*. Harper Perennial, 1991.
- Spierenburg, Pieter. "Honor and Violence in Europe, Through the Ages." *The Conversation*, 2014. Accessed 17 June 2021. www.theconversation.com/honour-and-violence-in-europe-through-theages-32323.

Characterizing microporous nanocomposite epoxy thermosets (MiNET)

Marian Schenke^{1,S,§}, Molla Hasan^{1,M}

1. Department of Mechanical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: valdesschenke_m44951@utpb.edu

ABSTRACT

Applications for porous materials with a controllable surface-to-volume ratio and chemistry range from tissue engineering and catalysis to smart filtering, fuel cells, and sensors. To make microporous nanocomposite epoxy thermosets (MiNET), a mixing pathway is demonstrated in which the high-shear mixing of immiscible liquids, surfactants, and nanoparticles kinetically confines a viscous fluid. Epoxy resin, vegetable oil, epoxidized soybean oil, and other nanoparticles like silica, activated carbon, alumina, and zinc oxide are used to create the MiNETs widely used in industry. MiNETs created using the given method are treated at ambient conditions. Helium Porosimeter was utilized to measure the porosity of the MiNET. We found a maximum porosity of 52%. We also determined the electrical resistivity of carbon nanofiber and graphene-based MiNET. We achieved a minimal resistivity of 500 ohms. MiNET can be employed in fuel cell applications due to its high porosity and low electrical resistance.

Develop an economical contact angle measurement system

Bamidele Jenkins^{1,S,§}, Molla Hasan^{1,M}

1. Department of Mechanical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: jenkins_b45185@utpb.edu

ABSTRACT

Wetting is a ubiquitous phenomenon in nature, and tuning the wetting of surfaces is the key to making them superhydrophobic or super hydrophilic. The static and dynamic contact angles measure surface wettability. A contact angle measurement system, known as a goniometer, is, however, not easily accessible to many research labs due to the high cost of the instrument. This study proposes a low-cost goniometer using a microscope camera and a three-dimensional stage. A mobile phone can be used to capture a droplets' image. ImageJ, an open-source software developed by the National Institute of Health (NIH) image, analyzes contact angles. The cost of the goniometer is \$300, which is an order of magnitude lower than commercial products. We anticipate that the suggested contact angle analyzer will have a favorable influence in resource-limited research labs and educational environments as open-source software and hardware modules improve.

Three-phase fault simulator

Mackenzy Mathson^{1,5,§}, Hayden Cressman^{1,5}, Mohsin Jamali^{1,M}

1. Department of Electrical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: mathson_m02497@utpb.edu

ABSTRACT

Protection relays are essential components used in power systems. They detect fault conditions and can eliminate or reduce damage once the fault has been detected. Protective relays can detect a problem by identifying slight deviations in current, voltage, resistance, or temperature. A protection relay can detect the fault contributors, which fuses and circuit breakers cannot do. The paper “Assessing the Effectiveness of Self-Tests and Other Monitoring Means in Protective Relays” states, “The goal of protective relay testing is to maximize the availability of protection and minimize the risk of relay misoperation. With this in mind, we must define adequate testing and monitoring practices for digital protective relays.” Testing protective relays is critical in keeping personnel and equipment safe. Currently, no inexpensive device uses low voltage to test a protective relay. This project aims to design a three-phase fault simulator and detection system to test protective relays to check their efficiency and accuracy. A detailed design will be provided.

Automated battery energy storage system

Johnpaul Fleming^{1,S,§}, Kandus Box^{1,S}, Quade Creswell^{1,S}, Mohsin Jamali^{1,M}

1. Department of Electrical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: fleming_j44764@utpb.edu

ABSTRACT

Economic growth and renewable energy demand are crucial in developing energy-intensive technologies for customer use. Battery Energy Storage Systems (BESS) are the leading effort to combine a sustainable power supply with a reliable dispatched load. Electricity demand directly relates to consumers' increasing demand for a more reliable and uninterrupted energy supply. By automating the BESS, we can equip the system with intelligent technologies to improve efficiency, compliance, and customer satisfaction and reduce errors. Automation improves accuracy, reliability, and productivity, leading to cost reduction, time improvement, and production success. An automation system presents an integration of sensors, controls, converters, programming, and switching modules designed to perform a function with minimal or no human intervention. This project aims to design, prototype, and test a BESS that will automatically switch from a state of charge to a state of discharge to provide electricity when needed. A detailed design of the automated BESS will be presented.

Automated dog feeder

Slaton Bird^{1,S,§}, Kelby Lang^{1,S}, Brian Grahmann^{1,S}, Mohsin Jamali^{1,M}

1. Department of Electrical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: bird_s27932@utpb.edu

ABSTRACT

Dog health and lifespan are a priority for many pet owners. Additionally, food aggression in dogs is a hurdle numerous people struggle to minimize. Multiple dog feeding dispensers are currently available on the market, but many dog owners still encounter issues keeping their animals healthy and safe during feeding time. Overfeeding canines is a problem that countless pet owners struggle with. As a result of a continually growing market, there is a strong need for a product that easily enables dog owners to feed their dogs remotely in a healthy manner while maintaining a safe environment for both animals and humans. It would also be necessary for this product to service multi-dog homes. According to the Veterinary Center of America (VCA) Animal Hospitals, approximately 25-30% of the general canine population is obese in the United States, with 40-45% of dogs aged 5-11 years old weighing in above that healthy weight range. Furthermore, the Raw Bistro Blog states that food aggression is quite common in dogs. One study reported that nearly 20% of all dogs show signs of food aggression. According to the results of a 2021 survey conducted by the American Pet Products Association, dog ownership in the United States has increased by 13% since 1988. Most dog-feeding products on the market fail to safely feed multiple animals with different types of foods in a single device. This system design aims to produce an apparatus that can safely service multi-animal homes remotely while eliminating food aggression incidents. The product will contain multiple compartments for housing differing types of dog foods. A user interface will allow clients to enter a feeding amount and schedule. A unique sound will alert a specific dog for its feeding time, and after the alerted dog is within one meter of the device, a compartment will open, making the food available to eat. If the incorrect dog gets within 1 meter of the apparatus during another dog's feeding time, the compartment will close until that dog is out of the one-meter range. In this way, the product is self-training in reducing food aggression and confrontations between pets. This will also ensure that each dog stays on a specific and healthy feeding regimen.

Self-sufficient engineering building via solar power

Alejandro Rodriguez^{1,S,§}, John Escontrias^{1,S}, Vicente Hernandez^{1,S}, Mohsin Jamali^{1,M}

1. Department of Electrical Engineering, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: rodriguez_a38341@utpb.edu

ABSTRACT

Renewable energy is an efficient method of saving costs on power, especially for larger buildings such as the UTPB Engineering building. The amount of power used by the building makes investing in a renewable power system, such as solar, a reasonable design to analyze and consider. This system would not only have economic benefits, but also help the building become self-sufficient by producing and storing power. In 2021, Texas became the top solar market in the United States, making this system a very viable option for the university to consider. The objective of this project is to do an analysis of what it would take to power the UTPB Engineering building with solar panels to become self-sustainable to reduce the strain on the power grid. This includes designing a solar panel system that can power the building during heavy usage, while also being able to store a sufficient amount of power. Detailed design will be presented.

Visualizing oil well activity in the Permian Basin

Erick Nevarez^{1,§}, Quan Yuan^{1,M,§}

1. Department of Computer Science, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: yuan_q@utpb.edu

ABSTRACT

This project proposes an application designed to visualize the activity of oil wells in the Permian Basin, Texas. The primary objective of the project is to present oil well data in an easily understandable format that provides insights into the oil industry for both experts and the general public. The data used for the project is collected from the Railroad Commission of Texas, which publicly provides data about the location and activity of oil wells in the area. The project aims to contribute to the public's understanding of the oil industry in the Permian Basin and its impact on the local community, environment, and economy. Through the web application, users can gain an intuitive understanding of the oil industry by visualizing the activity of the wells, seeing how they contribute to the economy, and learning about the challenges faced by the industry. The web application's simplicity and interactivity ensure that it can be accessed and used by many stakeholders, including students, researchers, investors, and policymakers. The project's ultimate goal is to provide valuable insights into the oil industry for all stakeholders and promote informed decision-making regarding oil well development and management. Overall, the project provides an opportunity for the author to gain experience in data visualization and contribute to the wider community's understanding of the oil industry in the Permian Basin. By presenting the data in an accessible and understandable format, the project aims to promote transparency and informed dialogue around the industry's impact and future direction.

Use of phytoplankton as a carbon sink

Robert Funderburg^{1,S,§}, Athenia Oldham^{1,M}, Milka Montes^{2,M}

1. Department of Biology, UT Permian Basin

2. Department of Chemistry and Physics, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: funderburg_r52597@utpb.edu

ABSTRACT

Trees are commonly used to offset the carbon released into the atmosphere; however, trees grow slowly and take up considerable space. Phytoplankton, on the other hand, is quickly growing and can be grown almost anywhere you can put a tank of water. Using these faster growth rates, more carbon should be able to be captured in a shorter time frame. However, not all plankton are equal and may not absorb carbon as well. Here we show the differences between four species of plankton grown in the lab in their ability to absorb carbon. Plankton account for roughly 40% of the total carbon fix of the Earth and only makeup 1-2% of the total plant biomass. By looking at individual species, we will better understand how individual species of plankton impact Earth's total carbon dioxide absorption and manipulate that for better ways of capturing carbon and slowing the effects of carbon dioxide on global climate change. Results show that using plankton, excess carbon dioxide can be extracted from the atmosphere more efficiently than just planting terrestrial plants alone. We expect that growing plankton will be an effective tool that can be refined further with the correct selection of plankton species. Our research will show the differences in a few selected species and their abilities as a sink for carbon dioxide.

In vitro investigation of motor neuron degeneration in a culture primary mouse motor neuron model

Jeffrey Brown^{1,S,§}, Xuemin Xu^{1,M}

1. Department of Biology, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: brown_j45210@utpb.edu

ABSTRACT

Amyloid lateral sclerosis (ALS) is a neurodegenerative disease of motor neurons, eventually leading to paralysis and fatal respiratory failure in ALS patients. The mechanisms behind this eventually fatal disease have not yet been fully characterized. Still, one area of research involves a distinct cell signaling pathway called apoptosis (also known as programmed cell death). The programmed cell death signaling pathways involved in neurodegenerative diseases such as ALS and Alzheimer's have not been completely identified. One experimental model for neurodegeneration involves in vitro culture of isolated primary mouse motor neurons followed by withdrawal of neurotrophic factors (NTFs). Death Receptor 6 (DR6) has been shown to play a role in apoptotic signaling pathways related to neurodegenerative diseases, and mouse motor neurons cultured in vitro are protected from NTF-withdrawal-induced degeneration upon inhibition of DR6. DR6-induced apoptosis has recently been shown to depend on the mitochondrial protein Presenilin-1 Associated Protein (PSAP), and cells that have experimentally reduced expression of PSAP show a significant reduction in DR6-induced apoptosis. To further investigate the role of PSAP in the DR6 signaling pathway and motor neuron degeneration, we set out to utilize our PSAP-knockout mouse model to extract and culture primary motor neurons as an in vitro primary cell culture model. By doing this, we will provide new insights into the mechanisms behind neurodegeneration and novel apoptotic signaling pathways.

Exploring the impacts of drug repurposing on stock prices

Jessica Peng^{1,S,§}, Xu Zhenning^{1,M}

1. Department of Biology, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: peng_j58248@utpb.edu

ABSTRACT

Drug repurposing or using a drug “off label” refers to medical providers prescribing a drug for a condition or treatment different from the one the Food and Drug Administration approved. Drug repurposing was spotlighted during the Covid-19 pandemic when anti-parasitic drugs such as chloroquine and hydroxychloroquine were used for their immunosuppressive qualities. In 2023, the type 1 diabetes drug Ozempic received immense attention due to high-profile celebrities using it off-label and losing significant weight. Both of these drugs experienced national shortages when their off-label use came to light. Whether a drug is being used as a lifesaving tool or for vanity reasons, drug repurposing is vital for the pharmaceutical industry because it can save time and resources by leveraging existing knowledge about the safety and efficacy of drugs. For my project, I would like to explore patterns related to when popular off-label drugs are put into the spotlight and the price of stocks in the pharmaceutical industry. Drug repurposing is a cost-effective method of research and development, and my objective would be to see how drug manufacturing companies can utilize these savings and prevent stockout.

Evolution of *Staphylococcus aureus* to avoid diagnosis in cystic fibrosis

Jose Zapata^{1,S,§}, Alexis Rozen^{2,S}, Anthony Fischer^{2,M}

1. Department of Biology, UT Permian Basin

2. Department of Microbiology, University of Iowa

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: zapata_j76907@utpb.edu

ABSTRACT

Cystic fibrosis (CF) patients are susceptible to chronic *Staphylococcus aureus* infections. We recently found that some *S. aureus* strains were misdiagnosed because of their atypical pink color on mannitol salt agar (MSA). We hypothesized that these mannitol-pink *S. aurei* evolved during chronic infections. To test this, we cultured *S. aureus* on tellurite agar. We subcultured isolates on MSA to identify mannitol-pink *S. aureus*. 36 mannitol-pink *S. aureus* isolates were cultured from 12 patients. These represented six unique sequence types. Phylogenetic analysis showed that mannitol-pink isolates were unique to the patient and closely related to the patient's mannitol-yellow isolates. This suggests that mannitol-pink *S. aureus* evolved independently in each patient during chronic infection. Some strains had non-synonymous or frameshift mutations in *mtIF*, which encodes the mannitol importer. Other genes with mutations included *mtIR*, *mtID*, and *pyk*. The loss of function in these genes likely explains the atypical pink color of MSA that caused the misdiagnosis of *S. aureus*.

Effects of microgravity on the formation of *Serratia marcescens* biofilm

Kedaijah Evans^{1,S,§}, JoAnna Clayton-Hernandez^{1,M}, Paula Gutierrez^{1,M}, Swetha Kesavan^{2,S}

1. Department of Biology, UT Permian Basin

2. Departments of Health Sciences and Anthropology, Rice University

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: evans_k52747@utpb.edu

ABSTRACT

The goal of the project was to determine the effects of microgravity on biofilm formation. *Serratia marcescens* is a bacterium that occurs naturally in soil and water and produces red pigment at room temperature. *Serratia marcescens* can cause healthcare-associated infections and develop antimicrobial resistance. This bacterium is also abundant in damp environments. The bacterium was sent to the International Space Station, and growth was initiated, with a ground control experiment occurring on Earth, simultaneously. Sending *Serratia marcescens* allows astronauts in space and researchers on Earth to visually detect the differences in the development of bacterium in space and on Earth.

Characterization of the UTPB Edwin B. Kurtz herbarium

Analiza Rayos^{1,5,§}, Jaqueline Barrera^{1,5}, Irene Perry^{1,M}

1. Department of Biology, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: rayos_a94129@utpb.edu

ABSTRACT

Bioinformatics is the technology used to analyze and compute biological data for comparison and interpretation. It is most commonly used in biology, computer science, and mathematics. There is a lack of knowledge about plant specimen information in the Permian Basin. With the digitization of the UTPB Edwin B. Kurtz Herbarium, we are providing that information to the Texas Oklahoma Regional Consortium of Herbaria database (TORCH). With the Excel file of the herbarium catalog, we are using the R Cloud studio app to analyze the ten most common and ten least common plant families. With the help of Dr. John Garza, a mathematics professor at UTPB, we coded graphs and analyzed the collected data. The R Cloud studio is our bioinformatic analysis to interpret and compare data. With the information, we can research why they are the most and least common plant families in the Permian Basin. We also compare our information to different regions in other databases like TORCH. With the comparisons, we can better describe the biodiversity of the Permian Basin. We acquired coding skills used for the R Cloud studio and analyzed scholarly articles to acquire the information needed for our comparison. In addition, we can organize and present the information to a general audience. These skills and experiences deepen our current academic knowledge and prepare us for future graduate work.

Digitizing the UTPB Kurtz herbarium

Jaqueline Barrera^{1,S,§}, Analiza Rayos^{1,S}, Irene Perry^{1,M}

1. Department of Biology, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: barrera_j44742@utpb.edu

ABSTRACT

The objective of this project is to digitize the UTPB Herbarium. This project aims to capture the dried plant specimen in detailed images with their label information and to make these images and information available in a public database. The details affiliated with each specimen will be uploaded to the Texas-Oklahoma Regional Consortium of Herbaria (TORCH). By digitizing the herbarium, other scientists can access information remotely; specimen damage is thus reduced. The UTPB Edwin B. Kurtz Herbarium (~ 1300 species) has been ongoing since 1973 and continues to add important biodiversity information. We are looking at when and where species appear within the herbarium collection. Biogeography studies the geographic distribution of plants, animals, and other life forms. We have created a station that records fine-detail images with a custom lightbox providing enclosed lighting for imaging specimens. When scanned, the bar code stickers on each specimen will be digitized to contain information affiliated with each specimen. Imaging software will be used to process the captured images. PDF scans of the UTPB herbarium catalog were converted to a clean Excel file. Missing or multiple specimens were noted when organizing the herbarium and referencing the catalog file. Images and specimen information will be available in the public TORCH database. The biodiversity of our region will be better understood and accessible to study. The imaging station (lightbox – camera – computer) will be available to researchers in other disciplines. Herbarium digitization will improve organismal biodiversity understanding.

A sharing of West African drumming: an ethnomusicology study of the Ewe people of Ghana

Joe Estrada^{1,S,§}, Dan Keast^{1,M}

1. Department of Music, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: estrada_j81235@utpb.edu

ABSTRACT

This research is on ethnomusicology in the roots of percussion in West African drumming. Focused on the Ewe people of Ghana and exploring the extensive polyrhythmic structure of the dialect in drumming music, the research will conclude as three compositions displaying the rhythmic complexities and examples of both Agbadza and Gahu. As a lecture/recital, the three compositions will be performed along with provided lecture notes via PowerPoint presentation.

The study of images on various mediums

Faith Eleby^{1,S,§}, Christopher Stanley^{1,M}

1. Department of Art, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: eleby_f70554@utpb.edu

ABSTRACT

This study focuses on the repetition of images and image transfer methods using ceramic and printmaking materials. This project will use two processes: one involves images made directly on plaster slabs and transferred to clay slabs. The other process involves a printmaking process known as intaglio to create repeated images on ceramic materials such as plaster and concrete. The process with the plaster slabs images transferred to the clay slabs found that when the glaze was brushed on, and slip was added on top of the slabs, the transfer was more cohesive. For the areas not coated with the slip, less glaze transfer was found on the clay slabs. Results emphasized that through the process involving intaglio on plaster, it was discovered that with the water-based ink known as Akua, some ink was absorbed into the plaster, and some ink was not. Results through the concrete process determined that the oil-based etching ink produced better results for this substance than the water-based ink Akua as a clearer image was produced with the oil-based ink.

Modern doll making - from 3D model to doll

Emily Muscroft^{1,5,§}, Christopher Stanley^{1,M}

1. Department of Art, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: muscroft_e43072@utpb.edu

ABSTRACT

Ask any one person what the word “doll” means to them, and they will likely go on about their favorite fashion dolls they grew up playing with. To the general populous, the most extravagant dolls they will recognize are the Barbie or Disney collector's items, usually well crafted but well out of most people's price ranges. However, there is a whole sub-genre of multi-jointed dolls, where artists sculpt and cast their dolls in resin. Ball jointed dolls, as they are called, have a labor-intensive process that would initially entail hand sculpting the doll and its parts and then being sent off to be cast by a professional casting service. If the artist was equipped, they might have been able to cast their pieces themselves. Once the pieces have been cast and are back in the hands of the artist, they will be transformed into fully formed characters with the appropriate costuming and “makeup.” But, with the recent jumps in 3D printing technology, one could use a resin printer to print these dolls in their studio. The purpose of my research is to find out what the process of 3D printing my ball-jointed doll. I have sculpted my doll utilizing 3D programs such as Nomad Sculpt and Blendr, and have printed my project using the Elegoo Saturn S 3D resin printer. The final result is a doll that has been 3D printed in resin and costumed and painted to match my design.

Mystical printmaking

Daniel Ramirez^{1,S,§}, Mario Kiran^{1,M}

1. Department of Art, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: ramirez_d26559@utpb.edu

ABSTRACT

Tarot Cards started as heavily decorated playing cards commissioned by wealthy families in Italy; years later, they were transformed into the future reading and mystic cards that we know nowadays. I'm fascinated by fantasy and magic, and Tarot Cards are one of the few mundane items in our history that, through creative minds, got a new mystical meaning and different use. In this research, I attempted to recreate a deck of 12 cards with various designs, taking inspiration from antique and modern cards, using two different types of Printmaking, Intaglio, and Screenprint.

Textile in the world of printmaking

Daniela Guillen^{1,5,§}, Mario Kiran^{1,M}

1. Department of Art, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: guillenguille_d51585@utpb.edu

ABSTRACT

Printmaking is a form of art that involves creating images on a surface, such as a plate, block, or screen, and then transferring that image onto paper, fabrics, or another material. I used different techniques such as engraving, screen printing, and etching in this research. I created designs with different mediums and tested them with different inks, such as oil or water-based ink, on different fabric types. The results of this research support items designed to elaborate clothing accessories (bandanas, tote bags, scrunchies). The primary purpose of this research is not only to experiment with the different techniques and mediums, but also it allows us to see the outcome of what printmaking can do in today's modern world.

Structure of a plant-pollinator network at an urban wetland preserve in Midland, Texas

Evelyn Guerrero^{1,S,§}, Emilia Gutierrez^{1,S}, Chelsea Rodriguez^{1,S}, Sarai Badillo^{1,S}, Jeffrey D. Brown^{1,S}, Maggie Bullard^{1,S}, Calli R. Davis^{1,S}, Jackie De Santiago^{1,S}, Alexis R. Morales^{1,S}, Alondra Pando^{1,S}, Jose A. Zapata^{1,S}, Daniel A. Garcia^{1,S}, Kaylee Garcia^{1,S}, Jenny Hunt^{1,S}, Jacquelyn Lopez^{1,S}, Erica Newman^{2,M}, David Hembry^{1,M}

1 Department of Biology, UT Permian Basin

2. Department of Integrative Biology, UT Austin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: guerrero_e50446@utpb.edu

Presentation Abstract

Network approaches have been a significant focus of ecology research and have the potential to inform conservation efforts, such as in West Texas, where the oil and gas industry can have adverse effects on biodiversity. Native plant and pollinator populations must be conserved to maintain the ecosystems in Texas. Studies focusing on ecological networks are essential to implement practical conservation efforts. This study investigates the plant-pollinator network of the playa lake of the I-20 Wildlife Preserve in Midland, Texas. Our study focuses on whether introduced insects and plants are connected and also connected to native species within the network. In weekly observations, insect interactions with flowering plant species are recorded, and insect specimens are caught to be pinned and identified. We have collected over 500 insect specimens and observed over 1,450 plant-pollinator interactions. We will infer the structure of the network of interactions between plants and pollinators and analyze its structure using the R programming language. Our results will reveal how non-native species interact with native species. Furthermore, our research will provide insight into how land use in this region may affect pollination networks, becoming a resource to make meaningful choices to conserve native plants and pollinator biodiversity in Texas.

1918 Influenza and COVID-19 pandemics in two Texas cities

Genesis Martinez Morales^{1,S,§}, Ana Martinez-Catsam^{1,M}

1. Department of History, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: martinez_g04672@utpb.edu

ABSTRACT

This presentation covers the actions the El Paso and Dallas, Texas municipal governments took to protect and minimize cases during the Influenza Pandemic of 1918 versus those taken during the first wave of the COVID-19 Pandemic. This presentation shows whether local government responses to epidemics have changed, especially regarding the demographics in each municipality. Understanding how municipalities react to global pandemics is crucial, which can help communities better prepare for the next crisis. I draw parallels in how the municipalities tended to their nonwhite population in terms of treatment for both Influenza and COVID-19 and how that impacted the total number of cases and deaths reported in each area to showcase how and if the responses have changed over a century later.

Assessment of groundwater and environmental changes in Odessa and Midland, Texas

Frank Muniz^{1,S,§}, Joonghyeok Heo^{1,M}

1. Department of Geoscience, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: muniz_f89427@utpb.edu

ABSTRACT

Midland-Odessa is an urban area comprising three counties: Martin, Midland, and Ector, located in West Texas. Because of Texas's oil and gas production, the area has become one of the fastest-growing cities, with the area's economy heavily dependent on the petroleum industry. Assessing land use and land-cover changes for major Texas areas is essential for understanding the impact of past growth on future projections through uniformitarianism, with populations growing steadily at a constant level. The Texas Natural Resources Information System (TNRIS) provides a historical Imagery Archive. Also, U.S. Geological Survey (USGS) developed National Land Cover Dataset (NLCD) representing land-use and land-cover information. The historical database can be used to monitor the land use and land-cover changes in the area over the years and calculate vegetation and burn intensity indices. Using the observing database, maps can be generated, and how much the developed land has grown over the last 40 years can be tracked and measured. This research enhances and improves current data by providing additional time steps, from Landsat imagery to complete documentation on changes in land cover between 1980 and 2020 in the Odessa and Midland areas. This study aims to understand better groundwater distribution and contamination concerning the oil and gas industry in the Permian Basin of Texas. Focusing on the quality of groundwater in Ector and Midland County shows whether or not the oil industry is affecting the quality of the drinking water. Research has shown that hydraulic fracturing can potentially alter contaminant pathways to aquifers via increased advective transport and/or flow through existing fractures widened by unconventional oil and gas activities.

Hydrogen sulfide scavenging using an iron-based compound

Jose Zapata^{1,S,§}, Arleen Sanchez^{1,S}, Theppawut Ayudhya^{1,M}

1. Department of Chemistry and Physics, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: zapata_j76907@utpb.edu

ABSTRACT

Hydrogen Sulfide (H₂S) gas is used and produced in oil and gas refining and is responsible for various health hazards, which range from headaches and eye irritation to unconsciousness and death. As such, a reduction of H₂S release was explored using solid solution-treated reactants to produce a more efficient and effective methodology of H₂S scavenging. We prepared basic solutions of varying concentrations to stoichiometrically treat Iron(III)Hydroxide (Fe(OH)₃) and observe its effects on H₂S passing. This NaOH-treated iron-based compound served as filter media to pass H₂S gas through to determine the efficacy of the selected filter media. Preliminary studies indicate a positive correlation between increased stoichiometric NaOH treatments of Fe(OH)₃ and H₂S scavenging efficiency. As such, we hypothesized that using iron compounds treated with a highly basic solution would result in the minimized release of detected H₂S gas in an iron-mediated pathway of H₂S scavenging.

Saccharomyces cerevisiae heme oxygenase in oxidative stress response

Cynthia Hernandez^{1,S,§}, Adeoti Odubiyi^{1,S}, Gwynne Tolentino^{1,S}, Nin Dingra^{1,M}

1. Department of Chemistry and Physics, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: hernandez_c03601@utpb.edu

ABSTRACT

Heme oxygenases are essential enzymes for heme degradation and are a crucial component of cellular adaptation to stress. Our goal was to identify the involvement of yeast heme oxygenase protein (Hmx1) in oxidative stress conditions and to observe if the product of heme oxygenases, carbon monoxide, is vital for their role in stress response. The wild type and heme oxygenase knockout (hmx1Δ) strains of *Saccharomyces cerevisiae* were used for comparison. We examined the growth differences and the redox status of the cells under oxidative stress conditions. Given that a change in glutathione levels is an essential indicator of oxidative stress, redox status was measured using a glutathione assay that detects and quantifies reduced and oxidized glutathione ratio. Quantitative redox western blot was also used to see a change in the redox status due to the carbon monoxide, a molecule stemming from heme oxygenases.

Ruling out clinician gender bias in diagnosing borderline personality disorder

Morrigan Holmes^{1,S,§}, Jamie Hughes^{1,M}

1. Department of Psychology, UT Permian Basin

S. Undergraduate student researcher

M. Faculty mentor

§. Corresponding Author. Email: holmes_a48189@utpb.edu

ABSTRACT

Borderline personality disorder (BPD) is primarily considered a woman's disorder, accounting for 75% of diagnoses. However, some research using representative population samples suggests there may not be a gender disparity. The current literature suggests that sampling bias, biased diagnostic criteria, and clinician gender bias may play a role in gender prevalence. The existing research on clinician gender bias offers mixed results. Here, a vignette study improved upon prior research methods to clarify the mixed findings. Reviewing the case vignette studies and improving upon their methods gave a more precise test of the hypothesis: clinicians have a gender bias in diagnosing BPD. Participants were randomly assigned to a between-subjects gender condition and read identical vignettes with pronouns changed between conditions. The case histories presented in the vignettes met BPD and post-traumatic stress disorder criteria. Participants then provided their diagnostic impressions, treatment recommendations, estimated outcomes, and demographic information. Results found that clinicians do not have a gender bias in diagnosing borderline personality disorder, allowing future research to focus on other potential biases. Other variables predicted clinical judgments: clinicians that diagnosed the patient with BPD and those with an education in clinical psychology were less likely to believe their patients would respond to treatment or recover. The implications are discussed.