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of Dyson College

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FROM THE EDITOR

I am very proud of the work in this twenty-first volume of *Transactions*. There is once again a wide range of topics and disciplines represented, and we have included five works of art this time, a first for the journal. As always, I enjoyed working with the contributors as we honed their arguments and writing. Reflecting back on the process of putting the journal together this year, I realize how much being the *Transactions* editor has enriched my working life. In fact, my membership in the Society of Fellows overall has expanded my intellectual engagement with both faculty and students outside of my home department and campus. It has also sometimes led to special moments such as the one that occurred recently when one of the contributors to this volume, whom I had never met, stopped by my office to chat and give me a box of delicious baked goods from the bakery at which she works. That was just one of the many pleasures that the Society of Fellows has brought me over the years.

This volume includes three complex Chemistry and Physical Science articles, which presented me, as an editor, with unique challenges. Thus I am grateful to Dyson Society of Fellows Advisory Board members Dr. Zafir Buraei and Dr. Rita Upmacis, both of the Chemistry and Physical Sciences department, for their help in evaluating and editing these essays.

Thank you to Dr. Nira Herrmann, Dean of Dyson College of Arts and Sciences, for her support of the Society of Fellows, as well as to Dr. Maria Iacullo-Bird, Dyson's Assistant Dean for Undergraduate Research, Grants and Special Projects. And thank you to Norma Quiridumbay, Director of Operations of the Center for Undergraduate Research Experiences, who has been instrumental in helping Dr. Iacullo-Bird organize and run the Society's events, as well as in keeping the Society's records. It is a pleasure working with all of the Fellows!

Dr. Bette Kirschstein
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Anxiety and Anatomy

***by* CASSANDRA BALADO**

Faculty Sponsor
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Art, NY

Our physical bodies are strongly connected to our minds. Sometimes our bodies react before our minds can process how we feel. All of us express discomfort in our bodies through physical gesture. Those living with anxiety concentrate their worry into body gestures. Some are conscious of the tension held in their shoulders, while others may not realize they have a nervous foot tap. What interests me as an artist are the varying gestures between individuals. Everyone has their own tick manifested through stress and induced by situations. In my body of work, I explore the different gestures of those around me, observing the way muscles tense up, shake frantically, or completely gain control over the body. Anxiety has the ability to envelop the body in a way that impacts its ability to move—a heavy weight on your chest, the incapacitating darkness you cannot make sense of. Anxiety is a pressing force, making you experience a gesture. The *Anxiety and Anatomy* series focuses on five different gestures experienced by someone living with anxiety.

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The Uprising of the 20,000: The Shirtwaist Workers Strike and Its Impact on Female Immigrants

by **PHOEBE CALLARD**

Sponsored by
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History, New York

"If I forget you, O Jerusalem, let my right hand wither!"[1] shouted the tired and frustrated Ukrainian woman from the back of Cooper Union. With these inspiring words, Clara Lemlich moved the feet of twenty thousand women from across the world to action in New York City to demand fair pay, better working conditions and union recognition. This movement would catch fire and spread to the neighboring city of Philadelphia, creating what Samuel Gompers, a prominent leader in the Jewish labor movement, would later call a "revolution." United under the International Ladies' Garment Workers' Union (ILGWU), this group of working women went on strike for eleven weeks and proved that women, both established and new to the United States, held a powerful position in the labor movement and were a force to be reckoned with. Despite the plight of thousands of immigrant workers, especially women workers, being marginalized for years, The International Ladies' Garment Union's New York shirtwaist strike of 1909 (also known as The Uprising of the 20,000) was a major milestone for women immigrant workers and would have echoing effects for decades to come. The strike gave opportunity to a people who still continue to fight for a voice to this day.

1. Ross, Robert J. S. "Memory of Strike and Fire." In *Slaves to Fashion: Poverty and Abuse in the New Sweatshops*, 52-71. Ann Arbor: University of Michigan Press, 2004. http://www.jstor.org/stable/10.3998/mpub.15439.6

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Manipulating the "Master Narrative": Jean Rhys's *Wide Sargasso Sea* as a Response to Charlotte Brontë's *Jane Eyre*

by **ELI YAMPEL**

Sponsored by
Dr. Bette Kirschstein
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Charlotte Brontë's 1847 novel *Jane Eyre* has captivated audiences long after her death with a story of love, morality, mystery, and misery. The misery most emphasized in the work is that of the title character, who grows up without a loving family and falls in love with Mr. Rochester, a man she cannot be with since he is already married. However, there is another character in this pitiable situation that gets marginalized in Brontë's story: Rochester's wife, Bertha. Until the 1960s, the character was viewed simply, in Sandra M. Gilbert and Susan Gubar's now famous phrase, "the madwoman in the attic." But in 1966, Anglo-Caribbean writer Jean Rhys made her the protagonist of her novel *Wide Sargasso Sea*, in which she challenged both specific colonial ideas represented in Brontë's work, as well as the type of thinking that leads to such notions. She did so by refuting the "Master Narrative," or a singular representation of an underrepresented or marginalized group (Friedman 119).

Singular representations of anything are inherently flawed, but when the group being depicted is marginalized and cannot respond, the resulting canonized ideas about the "Other," or "those people," are truly detrimental. Nigerian novelist Chimamanda Ngozi Adichie warns of the perils of these one-off representations, which she labels "Single Stories." In her 2009 lecture at TED Global, Adichie tells the story of how her American college roommate, upon learning that she was from Africa, asked if she could listen to Adichie's "tribal music," and was consequently quite disappointed when Adichie revealed that she listened to Mariah Carey. Adiche expands on this by explaining how the lack of knowledge

about African culture had resulted in a single conceptualization of Africa for her roommate: "[She] had a single story of Africa: a single story of catastrophe. In this single story, there was no possibility of Africans being similar to her in any way, no possibility of feelings more complex than pity, no possibility of a connection as human equals." Due to the overwhelming tendency of canonized literature and media to marginalize the "Other," Adichie's roommate had a severely misguided understanding of Africans—an understanding that Adichie and other contemporary writers have fought to correct in their work. Similarly, in *Wide Sargasso Sea*, Rhys sought to challenge the western, canonized view of West Indians, as this view had led readers to write off the character of Bertha Mason Rochester in *Jane Eyre* as a crazy woman who was nothing more than a plot device.

In Brontë's novel, the marginalization of Bertha is quite evident: her character enhances the plot by providing a mysterious gothic element, her ultimate purpose to be an obstacle that Jane and Rochester's love must overcome (albeit one that resolves itself in an example of *deus ex machina* to rival the ending of Euripides' *Medea*). Prior to discovering the fire that Bertha sets at the end of Volume I, Jane hears a "demoniac laugh" and shortly after describes the sound as "goblin-laughter" (Brontë 126). After Bertha scares Jane in the middle of the night by tearing her wedding veil, which is hanging in Jane's room, Jane tells Rochester that "it," Bertha, reminded her "Of the foul German spectre–the Vampyre" (Brontë 242). When Jane's wedding is interrupted as she stands at the altar with Mr. Rochester, he takes her and the wedding party to the attic of his home, Thornfield, where they see Bertha. In Jane's words, "the clothed hyena rose up" (Brontë 250). From the beginning of Jane's arrival at Thornfield, Brontë uses Bertha to enhance the gothic atmosphere, and Bertha's dehumanization here adds to the gothic elements at play in the story.

Bertha's role soon transforms from a monster to be feared to a homewrecker to be resented. Jane's chance at a fairy-tale ending to her story is dashed by the revelation that Rochester is already married to one Bertha Antoinetta Mason. Confronted with his attempted bigamy, Rochester launches into a speech about his wife: "Bertha Mason is mad; and she came of a mad family…" (Brontë 249). The reader, sympathizing with Jane, cannot help but resent the very existence of Bertha Mason. Ironically, she is viewed as the one imposing on Rochester and Jane's happiness when she is the one who is actually married to the man. When Jane returns to Thornfield to find Mr. Rochester in the last volume, after having been away for almost a year, she stops at an inn before proceeding to the house. Hearing the innkeeper say that "the mad lady, who was cunning as a witch," has died, having set fire to the home and immolated herself, Brontë invites the read-

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The Physiological Effects of Spaceflight on Metabolic Processes

by **YASEMIN CIFTCIKAL, JOSEPHINE FARSHI, KALTRINA MULOSMANI AND KATARINA VUKASINOVIC**

***Sponsored by* Dr. Eric Chang**
Chemistry & Physical Sciences, NY

Introduction

Humanity's interest in expanding deep space human exploration and inhabiting other planets is becoming increasingly prevalent in today's society. Numerous efforts to improve aeronautics and develop new technology with the intent of supporting life somewhere other than Earth are launching a new space race. However, while technology may be able to support human life on other planets in the future, it is imperative that we understand the biochemical and physiological effects of spaceflight on the human body. When astronauts are exposed to microgravity for long periods of time, the mechanical unloading on their muscles due to weightlessness leads to muscle atrophy. The exposure of bone or muscle to mechanical unloading can cause reduced tissue generation. Furthermore, the merged effect of microgravity, along with cosmic radiation, induces a severe impact on calcium and bone metabolism. Long-term exposure to microgravity and cosmic radiation results in bone density deprivation, cardiovascular defects, and poor immune system performance [1-6].

As determined by adaptation, all living organisms require numerous proteins and enzymes in the correct amounts at a given moment to carry out physiological and metabolic processes. In humans, one such enzyme that is evidently affected by spaceflight is hexokinase, which is the enzyme required to carry out the first step of glycolysis [10]. Therefore, no matter how minimal the effect may be, numerous studies report that space travel alters the concentration of various proteins and enzymes in the body within muscle fibers, as well as in blood plasma. When analyzing the human body post-long term spaceflight, it is imper-

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A New Approach to Drug Discovery for the Treatment of Cryptosporidiosis

by **MOHINI GOBIN**

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Abstract:

Cryptosporidiosis is a potentially lethal diarrheal disease of immunocompromised individuals. In a recent study, it was shown to be the third leading cause of death in children from economically low-resource countries (Kotloff et al. 2013). Currently only Nitazoxanide is approved by the FDA to treat Cryptosporidiosis. However, it is ineffective against the most at-risk group of the population, immunocompromised individuals and young children (Abubakar et al. 2007). This leads to the call for more compounds to be created and tested in order to make more drugs available. Additionally, current methods of drug studies are not an accurate representation of the host-parasite interaction in humans.

With the use of new technologies such as hollow-fiber technology (Morada et al. 2016), we are able to imitate the intestine and maintain a long-term culture of the parasite *Cryptosporidium parvum,* the causative agent of cryptosporidiosis. Hollow-fiber technology is advantageous because it has the capability to test compounds over more than 48 h, while acquiring important chemotherapeutic data. In this paper, we explore two different methods, both using the same system, hollow-fiber technology, with various compounds supplied by collaborators from the Gates Foundation and the Broad Institute. In one experimental design, we want to determine if we can see a reduction of parasites or comparable results to data from other institutions after using hollow-fiber technology in order to validate the system. In the other experimental design, we are using hollow-fiber technology to develop drug-resistant parasites for biochemistry and genetic assays. Overall, the results from the experiments demonstrate the ability for hollow-fiber technology to be used as a model for drug discovery.

Introduction:
Cryptosporidiosis, the Disease, and *Cryptosporidium*, the Parasite

According to the Center for Disease Control and Prevention (CDC), Cryptosporidiosis is a human diarrheal disease caused by *Cryptosporidium hominis (C. hominis)* or *Cryptosporidium parvum (C. parvum)*. The parasite is found worldwide, with most infections resulting from the consumption of recreational water that has been contaminated with the feces of infected livestock, wildlife, or humans. The parasite infects the mid- to lower small intestine, resulting in acute to chronic diarrhea. During the infective stage, the parasite is difficult to control due its small size and thick protective outer wall, which is chlorine-resistant.

In recent years, there has been an increasing awareness of Cryptosporidiosis. In least developed countries, particularly in Asia and Africa, over 30% of children under the age of 2 are infected with the parasite (Kotloff et al. 2013). These children are vulnerable to the infection due to malnourishment, poor hygiene, and contaminated water sources, and children that survive the infection often have impaired growth and development.

There are two main species of *Cryptosporidium* that infect humans: *C. hominis* and *C. parvum*. *C. hominis* is transmitted from human to human, whereas *C. parvum* is transmitted from animal to human. *C. parvum* is widely used as a laboratory model for the disease and was the first species to be continuously cultured using hollow-fiber technology (Morada et

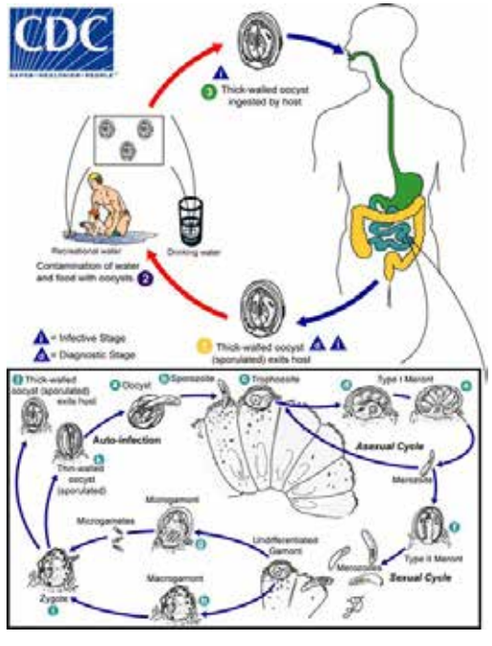

Figure 1: Cryptosporidium Life Cycle. From the Centers of Disease Control and Prevention. The parasite is ingested in the form of thick-walled oocysts which release four sporozoites that infect the intestinal epithelial cells. The life cycle continues through various other stages producing merozoites, gametes and finally more oocysts that can be thin-walled (auto-infect) or thick-walled (released in the feces spreading the infection to others).

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Initial Evaluation of the Water Quality from Selected Billion Oyster Project Restoration Sites

***by* JAHAIRA ZAPATA**

Sponsored by
Dr. Elmer Rico Mojica
Chemistry & Physical Sciences

Abstract

The Billion Oyster Project (BOP), funded by the National Science Foundation, is an ecosystem restoration and education project with the purpose of restoring one billion live oysters to the New York Harbor and simultaneously engaging thousands of school children through restoration-based STEM education programs. In this study, the water quality of selected BOP restoration sites was monitored during the summer of 2016 by looking at its physical properties. The pH, temperature and dissolved oxygen levels were measured on-site, and conductivity and total dissolved solids analyses were performed in the lab. Metal content (lead, nickel and cadmium) was determined using atomic absorption spectroscopy (AAS). The presence of micro-pollutants in the selected sites was also monitored using gas chromatography-mass spectrometry (GC-MS). Results show no difference in terms of physical properties among the selected sites and a reduced concentration of heavy metals in all selected sites. Results from GC-MS show the presence of octadecanamide, 15-bromopentadecanamide, phenol-2,4-bis(1,1-dimethylethyl), cyclohexadecane, skatole, 9-octadecenamide, and 1-octadecanethiol in all selected sites.

Introduction

The main goal of the Billion Oyster Project, a New York Harbor Foundation initiative, is to restore one billion live oysters to the harbor. This project started six years ago on Governor's Island at the New York Harbor School. Today

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Black Madonnas: The Effects of the Idealization and Stigmatization of the Social Phenomenon "Virginity" on African-American Women

by **LORRAINE BISHOP**

Sponsored by
Dr. Emily Welty
Peace & Justice Studies, NY

Ma•don•na
The Virgin Mary...
an idealized, virtuous and beautiful woman.

Introduction

Growing up as a young African American woman, my loved ones—my single mother, my older sister, my grandmother, and my father—always told me three things: "Boys only want you for one thing: sex"; "Wait until marriage before having sex"; and "You are worth more than what is between your legs." I always believed there was something pure, innocent, and respectable about being a virgin, and I held onto my virginity as if it was a precious gem. As soon as I entered the dating world, however, I was branded dull, boring, prudish and un-dateable because I was a virgin—and still am. I choose to abstain from having sex until I am in a committed and definitive relationship. Looking at our American pop culture and media, some say we have a weird obsession with sex, perhaps because it sells in our capitalistic country. When we focus on portrayals of virgins in movies, for example, we see failed attempts at love as the woman is dismissed because she is a virgin or abstinent. The virgin women of Hollywood movies are socially awkward, unattractive, typically accessorized with big glasses, and sometimes highly religious. They are never the ones who are chased by the boys, idolized by the girls, and get the boy and the kiss at the end of the

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The Effect of the Affordable Care Act's Medicaid Expansion on Self-Reported Health

by **SHEONA AHUJA**

Sponsored by
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Abstract

This paper assesses the effect of the Affordable Care Act's Medicaid expansion on the probability of having excellent self-reported health. Specifically, it seeks to discover if people in states with Medicaid expansion have a higher probability of self-reporting excellent health compared to people in states without Medicaid expansion. The empirical analyses in this paper use panel data and are based on the Annual Social and Economic Supplement of the Current Population Survey from years 2011-2016. Logistic regression is used to estimate the empirical model. The results of the study suggest that people living in expansion states are 0.51 percentage points more likely than people living in non-expansion states to have excellent self-reported health. The results also suggest that excellent self-reported health is more likely to be identified in whites, married individuals, and females. Additionally, probability of excellent self-reported health increases with income and education levels, and decreases with age.

Introduction

The Patient Protection and Affordable Care Act of 2010, informally referred to as Obamacare, is a health care reform law that was enacted in March of 2010. The law has three primary goals: 1) to make affordable health care accessible to more people by providing subsidies, or tax credits, to households with incomes between 100-400 percent of the federal poverty level; 2) to expand the Medicaid program to cover all adults with income below 138% of the poverty level, although not all states have expanded their Medicaid program; and 3) to generally lower the costs of health care through innovative medical care delivery methods. This paper specifically focuses on the second goal and on one of the provisions of the Act, the Medicaid Expansion program.

There has been an ongoing debate about the Affordable Care Act and its provisions, with supporters referring to it as a "historic victory that reforms the US health care system," and opponents calling it a "socialist and unconstitutional government takeover of the health care system" (Obamacare-ProCon, 2017). More than seven years after the law was enacted, I sought to find out how people perceive the healthcare provision of Medicaid expansion as having affected their health. I also analyzed the effect of the Affordable Care Act's Medicaid expansion program on the subjective health of the population. It is important to study this effect because government officials like to see how the people perceive new laws, which affects government success and elections. In fact, Jake Haselswerdt (2017) found in his study that increases in Medicaid enrollment associated with expansion were related to a considerably high voter turnout. He found that this effect was due to the increase in turnout for both new beneficiaries supporting the law, and backlash effects among conservative voters who opposed the law. This finding confirms the importance of testing the population's subjective health after the implementation of a new law.

Review of the Literature

In a study done by Blumenthal, Abrams and Nuzum (2015) at the five-year mark of the Affordable Care Act, Americans who initially did not receive meaningful health insurance and the care they needed reported a "considerable improvement in their access to healthcare" after the implementation of the ACA. They said that they were able to see their physicians often and that the restrictions on certain providers did not trouble them due to the benefit of their being able to receive healthcare. A similar conclusion was found in a study done by Sommers, Gunja, Finegold and Musco (2015), which asserted that among the 507,055 adults surveyed, the trends in coverage, access to primary care, medications, affordability, and health improved after the ACA was put into effect. Yet another paper by Courtemanche, Marton, Ukert, Yelowitz and Zapata (2016) suggested states that implemented the full ACA, including Medicaid expansion, increased the number of residents covered by insurance by 5.9 percentage points. From the above studies, it can be concluded that the law did increase access to healthcare for many who were previously uninsured, which was the

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