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BioMag

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IMPRESSUM

EDITOR'S NOTE

The importance of science communication has never been more obvious than it is now, in the midst of the COVID-19 pandemic. The way we talk and write about science can save lives, inspire changes in behaviors and actions and laws. We've seen the pandemic progress through the eyes of the press. We've educated ourselves on the virus, the vaccine, and the CDC guidelines through our televisions and computers, and we've felt more connected to our communities through this journalism.

BioMag is our attempt to communicate science in a way that it hasn't been communicated at Fordham before. A way, we hope, that is both effective and fun, and that brings the STEM and non-STEM communities closer. If we can do that through our magazine, then we have succeeded in our efforts— the key to the future of science journalism is inspiring the science and humanities fields to work together.

Fordham has a ton of really cool science happening, and a passionate science community. We hope you enjoy your read, and learn a little something as well!

I'd like to thank my E-Board for helping me pull this magazine together, y'all are fantastic.

President/Editor-in-Chief
Emily Huegler

FLAG DUTY

By: Katherine Laboda

My favorite part of the job was flag duty. Getting to lift the huge white flag out of the lighthouse and onto the rocky shore, seeing the wind raise its edges and reveal the black fluke at the center meant that whales were nearby! It is imperative to fly this flag to warn boaters that they're sharing their immediate waters with some superb cetaceans. When I signed up for a summer as an intern assisting an ongoing study of the Southern Resident Killer Whales (SRKWs) in their summer habitat of the Salish Sea, I expected to fly this flag a lot. And while I did get to raise it on a few occasions, the waving flag never announced the presence of SRKWs. Lifted for the intermittent humpback or a pod of transient orcas, it never heralded the object of our study: the whales that used to call these waters home.

We have a large whiteboard set up in the corner of the lighthouse/research station with a calendar containing updates on our daily sightings throughout the study period. Bob Otis, a behavioral psychologist and retired professor at Ripon College, has been collecting data on this specific ecotype of killer whale since 1990. For the first time in the 30 years that this study has been conducted, every single day from May 20th to August 10th sported a large, red X. For the first time in these 30 years, no data was collected on the SRKWs. For the first time, these whales failed to return to their summer habitat during this summer period.

To put this historic season into perspective, during the summer of 2019 there were a total of 3 passbys (what we call the entrance of whales into our study area) – still a pretty dismal showing, but not nothing. Just four years prior, in 2015, a total of 90 passbys were recorded. In the span of just six years, we've gone from reliably being able to see the whales about once a day during the 83-day study period, to not at all.

Why are the whales so suddenly absent from their home waters? The simple answer is these orcas are suffering from a severe lack of food. Southern Resident Killer Whales are notoriously picky eaters. About 80% of their diet is comprised of Chinook salmon ("About Orcas"). Not at all coincidentally, this summer showed unusual numbers for Chinook salmon runs returning to nearby rivers. Data collected from the Albion test fishery of Chinook salmon returning to the Fraser River in Canada – one of the major runs utilized by these SRKWs – shows information drastically different from historical data. Seen in the graph below, during the time of our study period (May 20th to August 10th), the numbers of fish returning to the Fraser was near zero. Also of note, there were large spikes of Chinook returning in the two-week span of about August 12th to August 26th. Unsurprisingly, the whales did return during this time, but again this timeline is outside of our study period so no data could be collected.

Despite these spikes in data, the Chinook population is decreasing. According to the Center for Whale Research, "the remaining wild Chinook salmon are at 10% of their historic numbers." Such a dwindling population of the prey that makes up a majority of these whales' diet does not bode well for an already endangered orca population.

But why are the Chinook populations struggling? We can point to a myriad of factors including overfishing from commercial fishers, habitat destruction due to damming rivers, and climate change warming natal streams. This last factor has gained much attention in recent months. Over this past summer, the Pacific Northwest suffered from historic heat waves, and salmon are especially fragile when it comes to water temperatures. For those unfamiliar with the salmon's life cycle, salmon eggs hatch in cold, oxygen rich rivers and streams. For the first year or so of their life, they rely on these freshwater environments. Unfortunately, and like the animals that inhabit them, these waterways heat up the quickest and are most susceptible to temperature change. Dams on river exacerbate river warming even more. Dams slow the water, increasing time spent warming by the sun. These salmon are effectively boiled alive and suffocated in the oxygen-poor warm waters, long before orcas out at sea have the chance to hunt them.

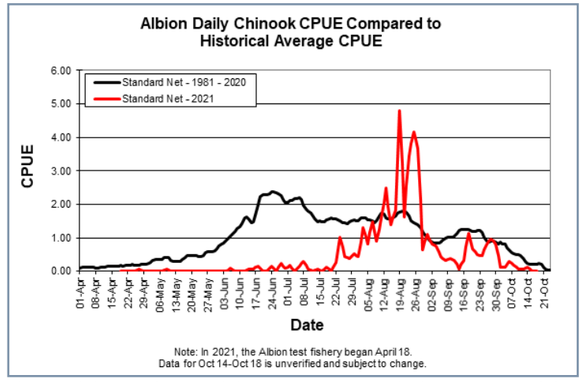

Fig. 1 Graph depicting this year's daily salmon return compared to historical average. 2021. https://www.pac.dfo-mpo.gc.ca/fm-gp/fraser/docs/commercial/albionCHdailytotal-eng.htm

The endangerment of these SRKWs has also been credited to two other causes: pollution and vessel noise, though it's important to qualify that these two are further compounded by the effects of hunger and malnutrition. Orcas are at the top of the food chain, a fierce apex predator. This means that orcas end up taking in all the accumulated toxins from their food and the food of their food, a process known as bioaccumulation.

Toxin accumulation isn't much of a problem when the whales are well-fed. These toxins are most often lipophilic, or fat soluble. When a whale is happily satiated, these toxins are hardly noticeable. When a whale is hungry, on the other hand, these fat reserves are metabolized, leaching harmful toxins into their bloodstreams. Therefore, a lack of salmon means a higher acquaintance with chemicals. We see proof of this food-toxin relationship through observance of the transient ecotype of killer whale, another type of orca found in the Salish Sea. Transients are marine mammal eaters, and their food is nothing but plentiful: Harbor seals pop their little bowling-ball heads like they're players in Whack-a-Mole.

Important to note is that transients are actually at a higher trophic level than the residents; the prey of transients' prey on the same fish that the residents prefer. They actually have higher levels of toxins built up in their bodies than the SRKWs. But they are not nearly as affected by them because they are not starving and then forced to metabolize these chemical-containing fat stores. There are about 320 individuals in the transient community that frequent these waters (Garrett). After recent deaths in the resident communities, the SRKWs number only 73. (Mapes).

These transients are thriving in the same waters as the residents should be, meaning that toxin levels and vessel noise are not the limiting factor in this equation. New whale watch restrictions limit the distance that water-based spectators can approach the whales. Devices such as the whale flag mentioned above clue boaters into what's happening around them on the water, urging them to slow down and therefore reduce vessel noise. At the lighthouse, we take behavioral data and compare it to the number and type of vessel present. We have not found a significant correlation that vessel traffic harms these whales.

Photo Credit: Katherine Laboda

Despite our inability to record any data this summer, we did get one chance to see the residents. One evening in July, the whales returned, though they passed by the lighthouse at 7 pm, after our study hours concluded at 5. Even though they came, we could not record the pass by to jeopardize the integrity of the study, so sightings stayed at "0." Sitting on the one flat, stone perch on the rear of the lighthouse, I sat as the sun sank behind the mountains on the opposite side of Haro Strait. The golden light spotlighted the regal dorsal fins of a family group of resident orcas and illuminated the drops of breath escaping their blowholes. In the magic of this singular sighting, water droplets turned to diamonds. The dorsal fins rose in unison, a forest of straight, triangular male fins and short, curved female ones. Members of all three family pods (J, K, and L) of Southern Resident had arrived, a rare occurrence even on the best of years. Not to stray too far from scientific discourse, it felt as though these whales were celebrating their return along with the spectators sprinkled along the rocks anxiously peering through camera and binocular lenses. Like the stark contrast of black and white orca coloration, I was filled with a tidal wave of contrasting emotions: joy at finally seeing these friends after months of anxious anticipation, hope that they might stick around, and anguish that we couldn't create a better world for these whales to thrive in. It is our actions that have caused the whales to stray further and further for food. The cold, hard truth is that human actions are causing the decline of these magnificent creatures. If we keep dumping toxins into our water systems, if we continue to dam rivers and destroy natural habitats, if we keep burning fossil fuels and contributing to the rapid increase of our earth's temperature, these whales might never come back. The whale flag might never fly again.

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Hey Siri, Find iPhone Repair Shop Near Me

BY: CLAUDIA STERKAJ

Picture this: you are walking along the busy streets of NYC and all of a sudden, someone bumps into you knocking your phone out of your hand and your phone falls. You hold your breath as you quickly pick your phone up and turn it around, revealing a cracked screen. What to do now? Do you take it to the nearest Apple store and hope they have the parts needed? Or do you take it to an independent repair shop and risk a subpar repair? Do we as consumers even have a right to repair our devices?

Tech Youtuber Marques Brownlee breaks down this idea in his YouTube video titled "What is Right to Repair?" There's two sides to this issue, the consumer side and the manufacturer side. From a consumer perspective, we technically own these devices and should be able to replace screens, batteries and anything else on our own or through an independent repair shop. According to the video, we already have the right to repair, but companies like Apple make it difficult to do so.[4] The manufacturer wants complete control over everything regarding the product, whether it be accessories or specific parts.[4] Apple intentionally makes it difficult for consumers to repair their devices because it will remove the dependence aspect between the customer and Apple. How do they do this?

Apple achieves this by making small changes to a part they use in their products while making a contract with the supplier that they can only sell it to Apple.[4] Independent repair shops are then unable to have access to these parts and fix Apple products. The only way they can do this is if they become certified through Apple, where they can "gain access to Apple genuine parts, tools, training, service guides, diagnostics and resources to perform a variety of out-of-warranty repairs for iPhone and Mac."[2]

If independent repair shops use third- party parts, Apple software recognizes that it is not genuine and will not show the health of the battery, but the user is still allowed to use the device.[3] Is it worth it? The prices for the parts are still high, so at this point, you might as well repair it through Apple, and be certain you are getting genuine parts. This is the loophole that traps customers.

Not only do these repairs become expensive for the customer, but they are also not environmentally friendly. Customers are forced to throw out a whole device just because one thing is broken. Especially when dealing with non-renewable and rare materials, being environmentally conscious is key. But when products are difficult to repair, it becomes easier to replace, further impacting the environment. The average lifespan of an iPhone is two years, and then it's time for either a new lithium ion battery or a new phone.[6] After two years, iPhones start slowing down, leaving customers with limited options.

Back in 2017, an Insider article claimed that Apple "is limiting how much power an iPhone processor can draw in certain circumstances, therefore limiting the processor's peak performance."[1] Basically, Apple is slowing down older phones. Conspiracies claim this happens because Apple wants users to buy the newest phone, but Apple debunked this saying they don't slow phones down on purpose.[1] If you want your phone to perform at it's best then replacing the battery is the way to go, leading us back to square one and our right to repair. Apple knows the influence it has on the technology industry, and is using it to its advantage.

In his video, Brownlee mentioned the MFi program, or "Made for iPhone," a licensing program for iOS device accessories and technologies for companies that must meet Apple's standards.[5] Some accessories include CarPlay, HomeKit and AirPlay. Apple is all around us, even if it's not shown through a staple product like an iPhone or MacBook.

The future is a never-ending evolution of technology and with technology becoming more and more integrated, it will become significantly more difficult to repair a chip or motherboard on your own. You definitely don't want to risk making repairs with cheap or refurbished products, especially when you are investing a good amount of money into a device. Apple as a company must now decide: continue increasing profit or look after the changing environment and consumer interests.

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In America: A Lexicon of Fashion

By Jennifer Tran

On Monday, September 13, 2021, the world eagerly watched as their favorite celebrities and influencers walked up the infamous red carpet lining the Metropolitan Museum steps. This year's MET Gala theme was "In America: A Lexicon of Fashion" and was interpreted by attendees in a multitude of ways. Some chose to go with a more literal interpretation, wearing garments constructed by American designers. Others, such as Nikkie de Jager, Barbie Ferreira, and Amanda Gorman, chose to dig deeper into American history by paying homage to people, places, and time periods that they deemed culturally relevant and important. As always, viewers wasted no time in reposting and rating outfits from the night on social media. The use of social media platforms to share and talk about these celebrity ensembles has only further contributed to the event's continuously growing popularity and notoriety.

While the gala is a charity event meant to raise money for the Metropolitan Museum's Costume Institute, the rising popularity of the MET Gala cultivates an unhealthy desire for luxury and excess among viewers. The extravagant display of fashion not only encourages mass consumerism but also creates an enormous amount of waste and requires an immense amount of energy.

The Metropolitan Museum itself uses the same amount of electricity and power as that of 10,000 homes! Furthemore, the sheer amount of fabric used to produce the stunning clothing pieces we see being worn by our favorite celebrities and influencers, along with the endless hours of labor that go into making these items, is incredibly wasteful. The materials used by these designers to construct these garments are also oftentimes not sustainably or ethically sourced, and many of the outfits worn by the attendees are either given to the celebrity to keep or returned to the designer to be placed in their archives. In either case, they are usually never worn again.

Consequently, the MET Gala, and events like it, only reinforce the cyclical nature of trends and instill shame amongst individuals who choose to repeat outfits, especially for formal events. Every year, hundreds of thousands of dresses and garments are purchased for weddings, proms, and other formal gatherings. These items are usually only worn for a few short hours before they are inevitably tossed into the back of one's closet, never to be worn again. In some cases, they are thrown out altogether.

However, formal wear is not the only cause of fashion pollution. Today, "fast fashion" companies like Zara, Forever 21, and Shein dominate the retail industry by producing cheap and trendy clothing for consumers. Although these items appear to be a good deal, they are constructed with materials and fabrics made with harmful dyes and toxic chemicals.

The production of these clothes also creates a huge amount of greenhouse gas emissions and helps fund unethical labor practices in developing countries. Materials for these garments are often sourced from one country to keep costs low. They are then shipped to another country for manufacturing, where the workers are exploited for cheap labor.

It is also important to be wary of brands that claim to be eco-friendly, when in reality, they are not. In recent years, sustainable fashion, along with sustainability in general, has been a trending topic. Many fast fashion companies, such as H&M, have attempted to capitalize on this by greenwashing their websites in an effort to make themselves appear more ethical and appeal to a broader audience.

Barbie Ferreira / Photo credit: Twitter

Third party services like Good on You can be used as a resource to find out more information about a brand's accreditations, source of materials, and ethical practices, making it easier to decide which brands to buy. Despite this, the best way to eliminate fashion waste is simply to wear what's already in your closet. Instead of tossing away clothing, repair any damaged garments, repurpose old clothes, and shop at second hand stores to prevent excess waste.

Thus, it is important to recognize the direct environmental impact of the MET Gala. It may seem frivolous and good-natured, but the implications and the immediate consequences of such an event can have a drastic effect on our planet.

Red-Tailed Hawks: A New York Icon

By Kari White

The cats are boring, the raccoons old news, and the rams a little...stiff. There's a new iconic Fordham animal in town: the red-tailed hawk.

Red-tailed hawks are as essential an element of New York City as pizza, bodegas, and traffic. The individual hawks, most noticeably Central Park's Pale Male, have inspired countless pieces of art, such as Marie Winn's novel, "Red-Tails in Love," and Janet Schulman's children's book, "Pale Male: Citizen Hawk of New York." More recently, NYU livestreamed a pair of hawks raising chicks on one of their buildings, and the blog Urban Hawks (www.urbanhawks.com) documents the different pairs around Manhattan every March, the beginning of mating season.

However, Fordham has just as long a history of red-tailed hawks as anywhere else.

In 2006 and 2007, a pair raised a total of six eyasses, or chicks, from their nest on top of Collins Auditorium. According to Urban Hawks, the pair was named Hawkeye and Rose. Hawkeye, after the character in M.A.S.H. played by a Fordham alumnus, and Rose after the Rose Hill campus. Living at Fordham enabled them to claim the Rose Hill campus and the Bronx Park, which encompasses the New York Botanical Gardens and Bronx Zoo, as their hunting grounds. This territory providied enough squirrels and pigeons to fill their hungry chicks' stomachs. Unfortunately, the pair did not return to their nest after 2007, and their current whereabouts are unknown.

However, while Fordham may no longer be these birds' home base, they still consider the Rose Hill campus within their territory. Red-tailed hawks are spotted around campus a few times a week, in flight, hunting, or just helping Father McShane keep an eye on the students.

Red-tailed hawks get their name from, well, their tail. They have a reddish-brown tail, pale beige underside, and dark brown feathers covering their back. Their rounded head and wings, as well as their fan-shaped tail, are especially visible while they are in flight. According to the New York City's wildlife website, the birds have a wingspan that can be up to 4 feet across, with female hawks being around 25% larger than the males.

Although many think of cities as hostile towards wild animals, red-tailed hawks have made the urban jungle their home. The most common hawk in North America, they traditionally live in deserts, forests, meadows, and woodlands. They live in large territories and will attack any encroaching threats with their ripping beaks and sharp talons. Typically, they build their nests between 15-70 feet off the ground, using trees, buildings, and even poles as potential nesting areas.

While New York City seems like a sparse environment, it abounds in the red-tailed hawk's favorite type of food. They've been known to eat rats, snakes, pigeons, and squirrels, which is why these urban dwellers almost always set up camp near parks. (You may have noticed, "squirrels." Is it any wonder red-tails call our campus home?)

Yet, living in the city comes with its own risks. Lots of places use poison to limit their pest populations, but that poison can work its way up the food chain and kill the hawks. Windows can also pose a huge danger, as hawks mistake the reflections of trees, grass, or the sky for the real thing. Placing stickers and decals on windows can limit the harm they pose, just as using snap-traps to kill rats helps, too. In Manhattan, Urban Hawks keep track of the known mating pairs noting the success and locations of their nests. Some of the more beloved hawks earn names, but most of them the author, D. Bruce Yolton, refers to by their location. In 2021, pairs set up nests at Inwood Hill Park, Randall's Island, Fort Washington, as well as others. A few sites that have nests almost every year include Washington Square Park, Tompkins Park, and Central Park. The birds typically remain in their own territories throughout the year, but some might change location. In the recurring sites, such as Central Park, birders see red-tails and other raptors almost everyday. So, if you're desperate to see one for yourself, Central Park is sure to provide a good birding opportunity.

At Fordham, Marina Francis, the owner of the @fordhambirds Instagram account, posts images of the hawks sitting in trees around Edward's Parade, resting on the top of the parking garage, and sitting in the trees around Martyr's Lawn. She notes that she often saw them sitting on Keating, or flying down the main avenue of O'Hare Lawn, Edward's Parade, and Martyr's Lawn. One of their favorite rest stops along that journey was the cluster of trees between Spellman, the Jesuit residence, and Tierney.

Alright, but how do you actually see them?

First, look up. Even if you don't see a red-tailed hawk, you might see a blue-jay mimicking one or a mourning dove singing to its mate. Once you start to pay attention to the birds around campus, you notice them everywhere.

Another tip: keep your ears open. Red-tailed hawks have a distinctive, piercing cry. Yet, crows and grackles also hate them. So, if you hear angry cawing, it might mean there's a red-tailed hawk getting heckled somewhere nearby.

Second, go out around noon. For most types of birds, the best time to see them is early in the morning. Fortunately, red-tails are sympathetic to college-student sleep schedules and typically hunt around eleven in the morning. Right before sunset is another great time to see them.

The world is wide and wonderful, full of birds in the sky and people ready to share their passion. If you happen upon a group of people standing together, looking up at a tree, stop and ask what they've spotted. Chances are you'll make their day, and whatever creature they're looking at will make yours.

Photo credit: Wildlife NYC

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Characterizing the Effect of RNaseZ Knockout on Pericardial Cells in Drosophila Hearts

By Chloe D'Errico

Hypertrophic cardiomyopathy (HCM) is a disease in which thickening of the heart muscle occurs, resulting in poor blood circulation. The highly conserved gene ELAC2/RNaseZ tends to be linked to extreme cases of HCM. This gene is responsible for encoding an enzyme essential for tRNA processing.

Liz Shim ('23) assisted Dr. Dubrovsky of the Fordham Biology Department this summer, as he worked to investigate the mechanism of RNaseZ-related heart damage using Drosophila flies as a model. Drosophila flies, or "fruit flies," have two types of heart cells: contractile cardiomyocytes and non-contractile pericardial cells.

Previous research implied that, in the absence of RNaseZ from the fly heart, the number of cardiomyocytes is increased. Dubrovsky was curious about how the non-contractile pericardial cells would be affected by the absence of RNaseZ. Liz's job was to document the presence and number of pericardial cells in flies at different developmental stages using a newly prepared tool, Hand-GFP, that specifically allows for observing pericardial cells under the microscope.

With state-of-the-art facilities, including 16 modern laboratories and a central Animal Care Facility, Larkin Hall is the center for most research for Fordham undergraduates. The lab consisted of two groups of 2-3 students assigned to a graduate student. Liz's mentor, Kate Migunova, assisted Liz with the four steps of the experiment: collection, genotype creation, data collection, and, finally, analysis.

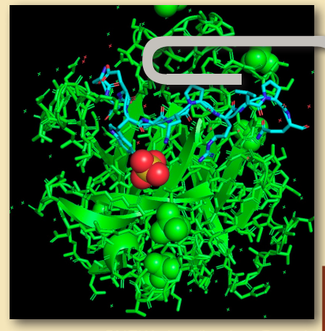
For the first step, Liz had to identify the period of time in which the flies mate, in order to obtain virgin flies. In order to set the cross correctly and obtain the desired genotype, Liz had to make sure the flies did not mate with other flies. Four phases of separations occurred after, first by gender, and then by controlled or experimental genotype. After creating the parents, the second stage requires another cross. Liz separated the flies into population boxes and then collected the eggs with an Agar plate. After peeling the shells of the egg, Liz was able to view the embryo itself under a microscope using fluorescent light. The pericardial cells of the hearts were then visible, allowing Liz to continue onto the third stage of the experiment.

The third stage can be divided into seven phases of development: embryonic, first instar larvae, second instar larvae, third instar larvae, early instar larvae, middle instar larvae, and late instar larvae. These flies altered in a heart specific manner had a substance known as Green Fluorescent Protein, which would allow Liz to gauge the intensity. Less of the protein implied less replication of the DNA, allowing Liz to conclude that, without RNaseZ, there would be lower levels of the indicator protein, and therefore a less efficient cell.

Liz is currently working on the fourth stage of the experiment: analysis. In this stage, the students will examine three different theories that may explain this trend and understand more about the relationship between ELAC2/RNaseZ and the heart disease hypertrophic cardiomyopathy.

Students Working to Treat Brain Cancer: A Look Into Research at Fordham

By Erika Carmody



SNEW visualized on Pymol

Cancer research is breaking news almost daily, with big science institutions often taking the front page. But did you know that groundbreaking cancer research is occurring right here on campus? I recently had the opportunity to interview sophomore Sophie Epstein and junior Jessica Tennet about their research in developing a mechanism for preventing brain cancer with Dr. Nicholas Sawyer of the Chemistry Department.

Before getting into the research, let's learn a little bit about the scientists behind the work. Sophie is a double major in Integrative Neuroscience and Sociology, the founder and president of the Women in STEM club and is a peer editor for the Fordham Undergraduate Research Journal. Science aside, she plays the violin and viola in the orchestra at Fordham and—fun fact—she is featured on an original Broadway album.

Additionally, Jessica is an Integrative Neuroscience major with a Cell and Molecular concentration and has a minor in history. She is currently a freshman advising student assistant, so if you are a freshman STEM major, there is a chance you have already met her in your advising group!

While brain cancer has many underlying causes, Sophie and Jessica are working with a specific receptor in the brain that is historically overexpressed in brain cancer tumors. This receptor is called the EphB2 receptor, and it is able to bind with different types of ligands. In order to prevent the receptor from being overexpressed, Sophie and Jessica are synthesizing a peptide called SNEW that only bonds to the EphB2 receptor and acts as a competitive inhibitor.

However, SNEW is not perfect. A manmade peptide currently in the process of being perfected, its structure is not stable. Due to SNEW being somewhat "flimsy," its binding affinity to the EphB2 receptor is not as efficient as the girls might hope. In order to stabilize the structure of SNEW, they're organizing a crosslinker that attaches to two different points on the protein that holds it in place. Attaching this crosslinker would mean that the structure of SNEW would move less and more readily bind to the receptor.

If they are able to stabilize SNEW, this research could potentially be a game-changer for brain cancer treatment, specifically benefitting people who suffer from meningioma or glioblastoma. In the future, the goal is for the pharmaceutical industry to continue to fine-tune SNEW and create a drug to downregulate the EphB2 receptor in brain cancer patients.

However, the research project is still in the early stages. Sophie and Jessica are currently synthesizing SNEW by hand using glass beads and a process called solid support peptide synthesis. Essentially, they are connecting amino acids by hand to build SNEW.

In my interview with Sophie and Jessica, we also discussed how their research has impacted their perspectives on their future careers. Sophie is on the pre-med track with hopes of becoming a neurosurgeon, but working in Dr. Sawyer's lab has made her consider doing research in addition to just surgery. Ultimately, this experience doing brain cancer research has opened the door to specializing in brain cancer within her future career as a neurosurgeon.

While Sophie is still discerning exactly what her future career will consist of, Jessica is fairly certain that she wants to pursue research for the rest of her life. Although she does enjoy learning about brain cancer, she wants to specialize more in neurodegenerative diseases in the future.

An Early Autumn Walk Through the Botans

By Madeline Drucker

Need a nice study break? Visit the New York Botanical Gardens located right across the street from the Rose Hill Campus Gates. Remember that admission to Fordham Students is free!

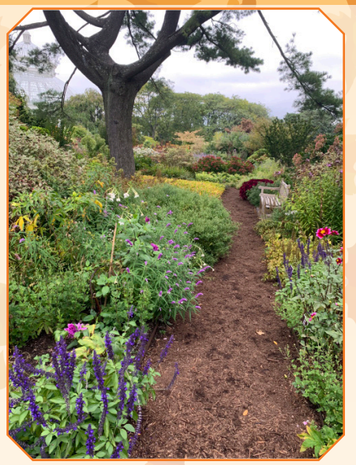
Colorful Gourds*

The New York Botanical Gardens, colloquially known as "The Botans," serves as a nice, peaceful space, a stark contrast to the city that surrounds it. Enjoy the seasonal scenery with a peaceful walk by observing the organic surroundings and their sounds. With the cooler weather approaching us, the plant and animal life begin to suggest these changes as exemplified by squirrels storing winter snacks and birds migrating in and out of the Gardens. These early stages of fall leave the delicate ecosystems within the Botans dependent upon their instincts and patterns to survive through the cold days approaching.

Enjoy some of the floral exhibits planted to show a beautiful display through each season, supplemented by annuals, biennials, and perennials. These areas around the gardens are enhanced with fall-colored, seasonal plants to create this autumn mood. Currently, cool, purple-colored astors and other blooms nicely contrast with warm golds and oranges of tall grasses and plentiful seed heads. Even some gourds, like the ones illustrated in the following image, decorate common spaces. Due to this period of temperature change and ensuing colder weather, many flowers have already disappeared for the year, leaving only the hardier ones behind.

The start of your walk in the gardens will be directed towards the main, dome-topped building, the Enid A. Haupt Conservatory. This large historic glasshouse holds plants from biomes around the world - deserts, rain forests, and aquatic areas - as well as seasonal exhibitions, currently supplemented by KUSAMA: Cosmic Nature. Lining the perimeter of the building lies two other accessible gardens, the Nancy Bryan Luce Herb Garden and the Perennial Garden. While wandering through the Herb Garden, you may see shiny green leaves of bay laurel, better known as bay leaves, or the spiky flowers of sage plants. Look for hops, a key ingredient in beer, and wandering nasturtiums, whose edible flowers are a beautiful addition to a summer salad. The Perennial Garden serves as a year-round spectacle with four distinct "rooms," each containing a distinctive assemblage of plants selected for either their color or seasonality. You must return throughout the year to enjoy the ever-changing display.

Nancy Bryan Luce Herb Garden*



Flower Path*

Extend your stay by taking a stroll through the expansive Thain Family Forest, placed within the center of the park, and it has changed, adapted, and survived for thousands of years. When you visit the Forest, you will get to walk along Native American hunting trails, see marks left by glaciers, and even pass under trees dating back to the American Revolution. Today, this is the largest uncut expanse of New York's original wooded landscape. The Forest remains as a magnificent reminder of the beauty and resilience of nature in the face of complex human-caused disturbances.

To preserve the Forest for generations to come, the Botans manages invasive species, native plants, as well as perform plant research and conservation to preserve plant biodiversity within the park and surrounding areas. An aspect of the Garden's new Forest Program, staff and visiting experts create a Natural History of The New York Botanical Garden to document the physical setting, biota, ecology, management, and ethnobotany of the site. Take a nice stroll to appreciate this diversity that surrounds you.

There are two major exhibits toward the back of the Botans, the Edible Academy and the Rockefeller Rose Garden. The Edible Academy includes a variety of beds where visitors can roll up their sleeves and dig in and cultivate vegetables, edible flowers, pollinator attractors, and more. The Howell Vegetable Garden provides daily activities and programs to engage visitors of all ages in planting, tending, and harvesting crops.

Edible Academy*

Permeable pavement and other materials allow for efficient stormwater management through infiltration and retention, improving water quality before it is released into the nearby Bronx River, the only freshwater river source in New York City. Only a brief walk away, the Peggy Rockefeller Rose Garden is among the most popular destinations at the Garden during the months of May through October, when

Roses from Rockefeller Rose Garden*

more than 650 varieties of roses are in peak bloom. These roses include heirloom varieties favored for their classic perfumes in addition to modern selections chosen specifically for their resistance to disease and pests as well as their great beauty and color.

The Botans has not only earned its notability and prestige through its growing years of existence and great popularity, but also for the inclusion of vast diversity of organisms and ecosystems coexisting in one place. Next time you are in need of a getaway, embark on an adventure through the Botanical Gardens to tune in to your botanist side!

All factual credit and information about the park is provided by signs and placards positioned through the gardens and The New York Botanical Garden website: https://www.nybg.org

*Photo credits: Madeline Drucker

Robby Nadler: On Decoding Zoom Fatigue Since Before the Pandemic

By Emily Huegler

In 2019, when Robby Nadler submitted an article about computer-mediated communication exhaustion to a research publication, a reviewer commented that he didn't believe it was a real thing. Two years later, we are all intimately familiar with Nadler's concept, although we know it better as 'Zoom fatigue.'

Well before the world shifted virtual, before most of us even downloaded Zoom on our computers, Nadler was trying to figure out why virtual communication is so exhausting. Now, he is one of the first to provide a theoretical framework for the causes of Zoom fatigue. His article, appearing in the journal Computers and Composition, identifies 'third skins' as the culprit behind our exhaustion.

Nadler, director of UC Santa Barbara's Academic, Professional, and Technical Graduate Writing Development Program, explains that third skins are the combination of ourselves, our background, and the technology we are using. When we engage in computer-mediated communication (CMC), as Nadler calls it, we view each other through these third skins instead of as isolated people. We are "flattened" into one with the sound and scenes of our background, and with the computer screen of the person we are talking to.

"In the real world, if I am next to you and there's a leaf blower, I think 'that's that other person's leaf blower. It's not you,'" Nadler says. "If you bring that sound into a Zoom meeting, that is you. To ourselves, when we hear things, they're outside of us. But to the person who's interacting with you, we are one in the same."

According to Nadler, interacting through third skins means dealing with spatial changes that are hard to wrap our heads around. The extra thinking it takes to have the same interaction is one of the root causes of CMC exhaustion.

These spatial changes include the added isolation of being alone in your own room and the Zoom screen competing for space with other computer tabs. Both add layers of separation between us and the people we're communicating with. We have to compete for attention with the physical disruptions in the world around us, which are more present than the people on our screens. And we have to use extra processing power to understand their body language. All this adds to the amount of effort it takes to productively interact with people through CMC.

So how has Nadler been studying a phenomenon for two years that most of us have only experienced very recently? He says it is thanks to his years of experience as an online writing consultant.

"It was a really big deal when audio and visual technology emerged," Nadler recounts. "But what the research showed was actually weird stuff happening." Sessions with video feeds were less productive than ones without them, and people noticed that students were behaving differently in an online setting than they did in person.

"And so I had already been theorizing that there's got to be a way to account for the eventuality that communicating online could drastically change how you feel and act," says Nadler. But he didn't have an application for third skins until the pandemic — until Zoom fatigue came along.

"It's a very silver lining, accidental in that I don't know if the research would have come out the way it did, had the pandemic not happened. I found my model."

Zoom fatigue wasn't originally going to be the focus of Nadler's research, either. He didn't think twice about it until his colleague Karen Lunsford pointed out a few sentences he had written on CMC exhaustion in his draft of a completely different paper.

"I don't even really remember the original piece that this came from," laughs Lunsford, an associate professor of writing at UC Santa Barbara. But she remembers thinking that the question of why CMC exhaustion happens would prove to have important implications — at the time, mostly for those like Nadler who did virtual consultations in writing centers.

By chance or not, Nadler began researching CMC exhaustion at the right time. He hopes that his work will help people test different ways to reduce their virtual exhaustion and that his theory on third skins can be applied to other CMC studies. He has big plans for his next research endeavors.

"Part of it is trying to figure out what is going to happen, waiting to see the dust settle," Nadler says. "Who comes out of lockdown being like, 'Actually, Zoom made my life easier,' versus the people who are like 'I never want to have that experience again— I'll keep it 10 feet away with a pole if I can help it."

He wants to know if there are any predictors of CMC exhaustion like socioeconomic class, access to technology, or gender. Getting to the root cause of the problem on a human level can help us understand how to better deal with it.

Although Nadler hasn't found a solution to Zoom fatigue and isn't sure there actually is one, he says his research has still taught him that we have much left to learn about how we interact with the world around us. "It's fundamental that we interrogate all of our practices because so much of us as people is really hidden," comments Nadler. "Tiny things we don't even think can impact us actually have such big ramifications on how we feel and exist."

For example, he says to think of the reviewer who didn't think CMC exhaustion was real. It took being on Zoom for hours a day for most of the general population to realize that it was impacting our experiences at all. "This came out so organically, despite that there could have theoretically been decades of preparation for this happening," Nadler says. He excitedly adds "There's so much more we can do and learn— we haven't nearly figured it all out." His paper is certainly a step in the right direction.

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