

Happy New Year!!

The 28 Percent

Women make up only 28% of the STEM workforce. This newsletter aims to change that.

By Ruby, 12th grade



January 2023

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Endangered Species Spotlight: Marine Iguana

written by Kaley Simkins

Scattered in the Galapagos Islands, marine iguanas are thought to have adapted to semi-aquatic life as a result of terrestrial iguanas drifting off to sea millions of years ago. Unlike land-dwelling iguanas, marine iguanas have a purely herbivorous diet and feed on underwater algae and seaweed. They will use their flat snouts and sharp teeth to scrape algae off of rocks and use their curved claws to cling to rocks both above and below water. After a tiring swim in the cold Ecuadorian waters, the iguanas like to sunbathe on the rocky shores and absorb as much sunlight as they can with their dark gray coloring.

These reptiles are the only ocean-swimming lizard species in the world and range from 2 to 5.6 feet long, with a crocodile-like laterally flattened tail that helps them swim smoothly. After feeding, marine iguanas use their special nasal glands to expel excess salt from the water, often creating a “white wig” of encrusted salt around the face. When food supply is low they have the ability to shrink their mass up to 20% to prevent starvation, but will quickly return to their comfortable size when well fed. Their population is considered vulnerable but it is difficult to track the numbers of this species; there are less than 250,000 alive.

The main threats to marine iguanas include disruption from non-native predators and climate change. Invasive species in the Galapagos like rats, feral cats, and dogs will eat the eggs and young of the marine iguana, stunting population growth. Rising sea temperatures aren't ideal for the red and green algae these iguanas feed on and lead to the rapid growth of brown algae, which can be harmful and even toxic to the reptile's digestive system. Additionally, rising air temperatures can interfere with the iguana's natural temperature regulation and cause complications with fertility.

Luckily, the marine iguana is legally protected under Ecuadorian law and the Galapagos Conservation Trust is working extra hard to ensure their safety. GCT is currently evaluating the risk of plastic pollution in oceans alongside partners as part of their Plastic Pollution Free Galapagos program. They are also investing in research projects that are investigating the possibility of an additional subspecies of marine iguana on San Cristobal Island by analyzing their population dynamics.



A Cool Woman: Luisa Boateng

written by Mallika Sheshadri

Luisa Boateng has just finished her first semester at Stanford, and she's just sixteen years old. As a 7th grader at McKinley Middle School, she was prepared to start high school at Pasadena High School — until she learned about and applied to Cal State LA's Early Entrance Program (CSULA EEP), designed for 11-16 year olds to leave traditional school and begin their undergraduate degree at Cal State LA. After being in the program for three years, Luisa transferred to Stanford and plans to graduate in 2025. Having been her classmate in middle school, I was curious to learn what prompted her to take this unusual path, and what she's been up to recently.

This interview has been edited for length and clarity.

What inspired you to join CSULA EEP?

When I first heard about EEP, I thought there would be a multitude of things I may not enjoy, the stress of college-level classes, the social environment with such small cohorts, and people I assumed to be socially awkward nerds (totally not me). Still, when I heard the students talk about their experience at the open house, I thought they were the coolest group of people I had ever met and wanted not only to be one of them but to be surrounded by them. They were so brilliant, but not in a competitive way like I'd known before. They each talked about their areas of study with such deep understanding and in a way that you could hear the passion for what they were doing and almost wanted to take some classes to share it with them. It was my first time seeing people involved in a rigorous study of wgss/femgen (women's, gender, sexuality, and feminist studies) or sociology. When you put it into words, it's kind of ridiculous putting 13-year-olds into college and asking them what they want to do with their lives, which I think is one of the biggest reasons that EEP is not for everyone, but, at the same time, I'm not sure that we as 13-years-olds processed that this is what we'd be doing “for the rest of our lives.” We thought we got to have fun and study whatever we wanted. Almost ironically, there was somewhat less stress in starting so early, because I had none of the responsibilities of adulthood, and could instead flourish in a carefree way.

What did a typical week look like for you in EEP?

I'd typically take two or three math classes, a humanities class, and something for fun, like archery or ceramics. I had a good amount of homework every week for some introductory classes, both in math and non-major classes. In my first couple of semesters, I'd spend a lot of time on things like labs or language homework but once I got to upper-division math, there was a lot less mandatory homework in every class so I'd instead read some math, spend time talking with my friends, and planning events as the social chair and alumni liaison of EEP club. While keeping up with my academics, I made sure to prioritize participating in personal activities as well, such as going to EEP social events and being on the apprentice team for Ballet Folklórico de LA.

What are you studying and how did you find that interest?

I'm a pure math major, doing research in algebra with applications to quantum computing and hoping to ultimately study algebraic topology and category theory. I came in undeclared because I'd heard so many stories of people taking a random class and then completely falling in love with the subject and changing their majors and I wanted to allow myself to explore and do the same. When I began the rest of the courses for my undergraduate career, I was partially guided by the Math Academy high school curriculum, perhaps somewhat competitively, and I remember thinking, "So obviously I'll take calculus 1, 2, and 3, then differential equations and linear algebra. Then I'll have to keep going and take abstract algebra", and I eventually realized that if I ever stopped, I'd always feel incomplete, like something was missing and I could've known more. I've always had a great interest in advanced mathematics and would often spend time reading about different concepts or areas. I soon realized that applied math was not for me and I'm much more adept at abstract thinking. My specific research interests began this summer when I was accepted to work with a professor because of her research in algebraic topology. We ended up switching to category theory last minute and in reading some introductory material, I thought it was the most interesting thing I'd ever heard of. Since then, I've continued my research (with CU Boulder) and feel more deeply interested in it the more I read.

What is it like being a woman in a STEM field? What's the general ratio of males to females in your classes?

I'm grateful that in my math classes, the gap isn't too bad (the racial breakdown is a whole other conversation, however), but I have been in some physics and engineering classes in which I am one of 3 or 5 girls out of about 20 students. In these scenarios, I find it best to stick with the other girls in the class and support each other but make sure not to isolate yourselves and still be part of the overall conversation. In my experiences, I'd often partner with the other girls for experiments or discussion exercises. I've also been lucky enough not to encounter too many prejudices in the judgment of my work, but rather struggle much more with the isolation and feeling out of place in these classrooms. Unfortunately, this imbalance extends to the faculty, and while the majority of my professors are old white men, I've also been extremely lucky to have amazing women as professors for some of my most interesting and important (to me) classes. They have acted not only as great examples of what a career in STEM could look like but also as mentors, supporting and guiding me through my academic career so far. I've also found quite a few women in fields like physics with a large social media presence. In general, I think one of the great benefits of social media is the ability to create communities of people separated by great distances. If you know where to look, there is a STEM community that is amazing and diverse, it's just made difficult that you have to know where to look.

How have you been settling in at Stanford? What's your favorite part, and your least?

It's been quite a lot, both good and bad. It's not only an academic adjustment but a personal one as well, living on campus in the dorms. Some aspects of it have been quite overwhelming but I've been able to adapt and balance my responsibilities quite well. My least favorite part is probably the stress that I've been caused, very much in part due to my own mistakes, but they've taught me lessons that will help me for the rest of my learning career. There are also a great many things that I have enjoyed, such as the people I've met and the classes I've been able to take. It's hard to pinpoint a favorite, but Stanford has classes called introductory seminars, which are small in-depth classes on subjects of specific interest. I was able to take some this quarter, one in the deployable spacecraft structures and one in architecture. At the beginning of each of these, I knew practically nothing on the subject but as my final projects, I was able to design a building and prototype for a deployable solar array. There are so many classes that I've been super excited about just by reading their course descriptions that I probably couldn't take elsewhere and I love the opportunity, not just to learn the material but also to interact with others that are fascinated by the same things as me.

Do you have plans for when you complete your undergraduate degree?

In terms of my career, I'm planning to get my PhD in pure math, and am looking at topology and maybe some category theory. After that, I plan to do a postdoc or two (or three) and then try for a tenure-track job. As I do pure math, the route has always been academia but I've since learned just how much there is to do here. I would really like to prioritize travelling as much as I can, which I've noticed a lot of mathematicians do through conferences and travel grants. I also realize how important mentoring is to building a strong and successful STEM community and plan to help as many students as I can with their careers as well.

What advice do you have for high school girls pursuing a career in STEM?

I could give you all the generic advice for pursuing a STEM career but I think the most essential advice is about developing yourself as a person and letting go of the need for external validation. I think the thing that has helped me the most in my academic career is the fact that I do what I do purely for myself. I've had moments in which I freak out about a grade or spiral and imagine dropping out but in each of these instances, my panic is the fear that I will not get to pursue what I love and not that people will be disappointed or think badly of me. The road to a career in STEM is long and somewhat difficult, but you will struggle so much more if you do it for anyone but yourself. If you find a way to integrate your academic interest into who you are as a person rather than make your academic success your entire identity, not only will it help you personally in your academic life but it will help you be able to relate to people and keep some sense of yourself when you encounter hardships. I know that without math I'd be a completely different person but I'd still be a complete person, which I believe is invaluable.



A Cool Woman: Monica Coto

written by Madeleine Lees

This past semester, myself and fellow 28% member, Celeste enrolled in a Biopsychology PCC concurrent enrollment course taught by Monica Coto, PhD. It has been one of the most interesting classes I've taken in high school and I highly encourage others to take it. I reached out to Monica to ask a few questions about being a woman in STEM and a professor.

Who are you and what do you do at PCC?

My name is Monica Coto. I am a psychology professor at Pasadena City College (PCC). My favorite classes to teach are Intro to Biological Psychology, Abnormal Psychology, and Research Methods.

What made you interested in STEM/biopsychology in the first place? What made you interested in teaching?

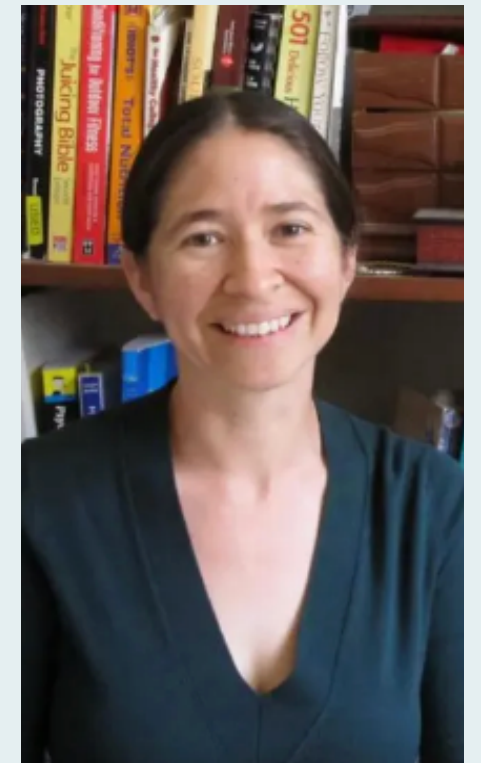
I have always been interested in the brain and how the body works. When I took an Introductory Psychology course in college, I loved the sleep chapter! I was fascinated about this change in consciousness we experience regularly in the 24-hour cycle. I wondered about the purpose of dreams and I was so interested in how we treat and understand sleep disorders.

What projects did you do before becoming a PCC professor?

At UCLA, I conducted a study with the U.S. Army to see how the attention process in the left and right hemisphere was influenced by time-of-day, sleep deprivation, and recovery sleep after sleep deprivation. I studied helicopter pilots. We asked them to complete a 52-hour sleep deprivation, followed by a 2-hour nap, followed by another 24 hours day of awake. Throughout that protocol I assessed three networks of attention (Conflict resolution, Orienting, and Alerting) in each of the cerebral hemispheres. My research showed that each of the networks showed independent daily rhythms, different neural dynamics during sleep deprivation, and different rates of recovery after prolonged sleep deprivation. The results seemed to suggest that attention networks are independent both within and between the hemispheres and can become out of synch when we are sleep deprived!

Any message for girls/women hoping to pursue a career in STEM?

We all encounter subtle (and sometimes blatant) messages about what role we should play in society. I distinctly felt that pressure as a woman from a low-income family when I was in grad school. But I also felt it in other spaces. I worked as an Emergency Medical Technician (EMT-1), which means I was a first responder working for an ambulance service. I worked as a Wilderness First Aid worker, doing emergency medical services in the backcountry. After that, I fell into work as a system administrator. I fixed computers for several years for a small retail company that had nine locations throughout Southern California. These were all very male-dominated fields. I didn't do these things to be contrary. I love learning about how the human body works; I love the outdoors and hiking; I am driven to help people; and I am a curious, puzzle-loving individual. So whatever career you pursue - whether it is in STEM or anything else - pick one that allows you to be the person and have the life you want to live. That is empowerment!



Is there anything else you would like to add?

I really love the goal of the 28% Newsletter. Thanks for letting me be involved, Madeleine!

After reading these answers, I notice Monica's email sign off is, "The brain is the most important organ." -The brain, which captures exactly the type of light humored person she is.

One of my favorite things to learn was the drug chapter. The changes and effects drugs can make to the system was something I found interesting, especially with the new barriers being broken with psychedelics. Celeste says her favorite chapter was learning about the optical system in the brain. She says, "As I was learning it, I would look around and I understood what was happening, like when we would learn about rods and cones.

Overall, the class was very insightful. We have both taken psychology and biology, but pursuing past the introductory courses has enriched our learning.

The Birds of Pasadena High School

written by Paulina McConnell

Every spring, Pasadena High School has a visitor: the Canada Goose. For weeks, these awkward and cranky birds grace the students of Pasadena High with their squabbles. They're a far cry from their graceful cousins, the swans, but they're a notorious member of the Bulldog family - a tradition. The geese can be spotted atop the E Building, roaming the soccer field, or even ambling down the main hallway. If you're lucky, you'll see them with tiny yellow chicks in tow.

Our Canada Geese serve as a good (and a pretty funny) reminder that humans aren't the only residents on this campus. Birds surround us: they fly into our classrooms, perch on flagpoles, and nest in shade structures. They're the background noise as we walk to class, serenading us from the nearest tree.

So, I decided to take a closer look at our roommates. In about a week, I found 22 species. It's worth noting that we likely have dozens more, because Victory Park - our neighbor - is a popular urban birding spot. A handful of rarities have been reported from the park, including a stunning Vermillion Flycatcher that's hung around for four years. But as for the school grounds, here are the basics:

In numbers alone, the Yellow-Rumped Warbler (right) takes the cake. On any given morning, this lively songbird can be found hopping around in the trees that line the back of the H or G buildings. It's a bit of a misnomer, so it's easiest to identify by a thin beak and yellow throat. The trees at the back are also popular among Western Bluebirds. Fun fact: bluebirds aren't actually blue - their bright colors are a trick of the light!



Yellow-rumped Warbler perched outside Mr. Crawford's class

PHS is home to House Finches and House Sparrows, which both are small, mostly brown birds that build scrappy nests under the roofs of walkways. While the finches are native, the sparrows are an invasive species that have taken up every corner of the globe. Another non-native on our campus is the European Starling, a small traveler from Europe, Africa, and Asia that sometimes occupies trees and fences in large groups. The Starlings are an iridescent black, and have tails that look too short for their bodies.

Some of the flashier birds prefer to perch on the tops of buildings in the afternoon, after most students have left.

One of these birds is the mischievous Say's Phoebe (below left) that can be seen doing flips and cartwheels in the air to catch bugs! It's similar in appearance to the larger Cassin's Kingbird, who instead has a bright yellow chest. The Say's Phoebe has a close relative, the Black Phoebe (below right), which although is usually solitary, is a real crowd-pleaser. Its signature head-tilt and tail-bob make it, more-or-less scientifically, cute. The Black Phoebe is also a famously gregarious bird - that is, it'll follow you around for several minutes to put on a show.

Many students have noticed a more intimidating presence: the Red-tailed Hawk. This is the biggest bird you'll find on campus, with a wingspan reaching 4 ½ feet in large females (in raptors, it's common for females to be up to a third larger than their male partners, a phenomenon called reverse sexual dimorphism... go ladies!). Last year, there was a popular Red-tailed Hawk that attracted large crowds of students and cameras from an unusually low perch. Exciting as this large creature is, it's not the only bird of prey at PHS: the smaller Cooper's Hawk, and even smaller American Kestrel, also swoop through the quad occasionally.

Common flyovers - birds that pass by overhead, but don't stop on campus - include Western Gulls, Common Ravens, American Crows, a few Mallard ducks and a very lost American White Pelican. And of course, it's impossible to forget the racket of the Red-crowned Parrots. Perhaps the most hated bird in Southern California (and definitely the loudest), these neon-green escapees from Northeast Mexico squawk their way through every inch of Pasadena. Our school is no exception.

Whichever way you look at it, our campus is flooded with birds: Acorn Woodpeckers stick to the sides of palm trees like magnets, Northern Mockingbirds chatter from the telephone wires, and Anna's Hummingbirds zip from leaf to leaf. The song of the Mourning Dove sets a somber tone in the afternoon. These birds use the same trees for shade that we do. They snack on our leftovers - it's as much their home as it is ours.



Say's Phoebe on the corner of the I building



Black Phoebe at the top of a tree outside the G building

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Check out our website:

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