

Volume XI // November 2021

Happy 1 Year Anniversary!

The 28 Percent

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



by Ruby, 10th grade

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**LAYOUT DESIGNED BY
JAIDYN, 10TH & GIANNA, 9TH**

Events & Programs

thursday, november 11 @ 7 - 9pm

Connected: How Tech is Transforming Humanitarian Response

*USC Michelson Hall for Convergent Bioscience
1002 Childs Way*

sign up on eventbrite!

No matter how far events are across the world, technology connects communities, offers shared immediacy, and presents new solutions and challenges. For people trying to escape from conflict zones, technology has often become a lifeline. Hear from tech entrepreneurs and volunteers on the frontlines of the humanitarian response in Afghanistan who are using technology to respond to global crises.

saturday, november 13 @ 10am - 2pm

Their Point of View Mentorship Lab

*Creative Solutions Los Angeles (CSLA)
2504 North Ontario Street Burbank, CA 91504*

sign up on eventbrite!

Are you between 13-25 years old? Do you identify as a woman, girl, or nonbinary youth of color? Do you want to step up your visual storytelling skills? Then RSVP to Made in Her Image x Creative Solutions' Their Point of View Mentorship Lab. You'll have the opportunity to rotate through hands-on learning stations, where trailblazing women, gender non-conforming, and BIPOC filmmakers will share insider tips and tricks using the latest cinema gear.



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03// A Cool Woman

Morgan Gaskell

Written by Mallika, 9th Grade
in collaboration with The Pasadena Chronicle



The COVID-19 pandemic was the reason for many people to take up various hobbies. Morgan Gaskell is a sophomore at PHS who took this time to explore the depths of ornithology, the study of birds. “I’ve always been a big wildlife enthusiast,” she said to me. “When I moved to my home in Southern California, wildlife was everywhere! I was so lucky to spot wildlife such as the American black bears and California mule deer wandering through my yard”

When quarantine began, she found herself turning to the most abundant wildlife in her yard—birds. “I put up two bird feeders and the birds came!” she said, “Quarantine really became a time for me to learn about my local species.”

What impressed me the most about Morgan was her knowledge and passion for the subject. She has her own website called the News for the Dedicated Zoologist, where she writes a bi-monthly newsletter about her discoveries and experiences. “I created News for the Dedicated Zoologist in February of 2018. I was in 6th grade at the time and had a wonderful math and science teacher who sparked my interest in STEM. I also had a fantastic English teacher who inspired me to share my writing.”

Last May, Morgan joined a bird banding group made up of individuals interested in ornithology from all over the LA area. “Every other week, I’m waking up at 3:30 am to get to Zuma by sunrise. For the next six hours, we’re catching birds in nets and processing them— taking measurements, determining sex and age from feathers, etc. Watching birds is one thing, but holding them in your hand lets you learn about the bird’s life.” she wrote in News for the Dedicated Zoologist.

Her website also includes documentation of birds she’s seen and nests she’s tracked in the last few years. Her publications are detailed and interesting, complete with phenomenal photography of her own experiences. Morgan Gaskell is truly a treasure to the world of STEM and biology.



**Subscribe
to the Dedicated
Zoologist!**

04 // Art Showcase

Birds of the Month

Taken by Morgan, 10th Grade



Your Prehistoric Origins

Written by Morgan, 10th Grade

Have you ever wondered why we hiccup? Or why some people are color blind, and if other animals are color blind too? Perhaps why humans walk on two legs or why our hands look the way they do? It turns out, the answers to these questions can be found if we dive into our ancient ancestors. Yes, this includes prehistoric humans, but also ancient primates, reptiles, and even fish! You see, we share a lot in common with other animals, even if you don't realize it yet!

Author, professor, and fish paleontologist Neil Shubin describes it this way: "Ghosts of our ancestors are present in our bodies today." It's true! Neil Shubin and his team discovered the first Tiktaalik roseae specimen in 2004 on Ellesmere Island, Canada, a specimen which ultimately unlocked a major point in evolution— the transition between marine and land animals. From here, Shubin made major connections between fish and humans, and the other animals in between. He published his book "Your Inner Fish: A Journey into the 3.5 billion Year History of the Human Body" in 2008, a wonderful read I must say! Let's explore a few of these connections!

23 million years ago, our primate ancestors were red-green color blind. Humans see in color, hundreds of different colors. How humans made this transition has to do with opsin. Opsin is a protein found at the back of the eye in the retina and is used to detect color. Non-human primates have two types of opsin, each set to see a different wavelength of light. In addition to the two, humans have a third opsin used to detect yet another light wavelength. Coincidentally, opsin 3 is located directly adjacent to opsin 2, suggesting that opsin 2 had duplicated and mutated in order to get the third opsin. Because humans were able to see more wavelengths of color, it was easier to distinguish ripe fruit from unripe ones, young leaves from old. The location of the eyes have changed over time as well. Tiktaalik had eyes on top of their head, allowing them to look up without their whole body leaving the water. Once the transition to land was made, many animals evolved to have eyes on the sides of their head, which gave a landscape view. When our primate ancestors made their way to the trees, depth perception became necessary and eyes migrated to the front of the head, as seen in Notharctus.

Notharctus didn't just contribute to eyes, but also to hand development. Discovered in 1870 in Wyoming territory, the 50 million year old Notharctus led an arboreal lifestyle, a life in the trees. Notharctus had a divergent thumb, that is a thumb that formed an angle with the index finger. The prehistoric primate also had nails instead of claws and lengthened fingers. Long fingers and opposable thumbs meant that Notharctus was capable of grasping thin branches, the places where fruit and flowers grow and insects live. We also see a lot of animals with similar arm anatomy, homologous structures. You may think that a hand is nothing like a wing or fin, but they are indeed similar. Each follows the pattern of one short bone (humerus), two long bones (radius and ulna), lots of bones (carpals), and digits (fingers). These animals sharing the homologous structure that is the hand evolved some 375 million years ago from a transitional animal like Tiktaalik.

The ear's function is to turn vibrations created by air into sound. This sound can then be sent to the brain for processing. All mammals, including humans, have three ear bones— the malleus, incus, and stapes. Reptiles and our reptilian ancestors have only one, the stapes. Here is where I think this all gets super crazy. Mammals hear with the bones that reptiles eat with. Mind blowing, let me break it down. Reptiles have a mandible, that is a jaw bone, connected to the skull by a series of small bones that form the jaw joint. Eventually, the mandible got so large, it touched the skull on its own. The previously formed joint was now vestigial, as in, it no longer served a functional purpose. Instead of disappearing all together, they changed over the next few million years. The old joint bones shrank and became the malleus and incus, which helped animals hear higher frequency sounds. Your next thought might be, where did the stapes come from, the bone that was hearing from the start? It turns out, the stapes can be traced back to fish who were making their transition to land. Unlike reptiles, amphibians, mammals, and birds, fish have no ears. Yet, they do have bones that would eventually become those used in hearing. What fish had was a hyomandibula, a large rod that connects the upper jaw to the brain case. Both the hyomandibula and stapes connect to an equivalent set of nerves. At the time when fish were making the transition from water to land, we see the hyomandibula shrinking in size, finally shifting to the location that now earns it the title of stapes. We see this transition in Tiktaalik, and other transitional animals. Why? Hearing in water is different from hearing on land where you are surrounded by air. So it turns out humans actually have a lot in common with other animals! In addition to the features mentioned above, teeth, legs, and the brain can all be traced back to our prehistoric ancestors. All it takes is a dive into prehistory to find those fish, reptile, and prehistoric primate origins.

How is this possible?

Created by Emma & Violet, 10th Grade

A man is holding a cup of water. He holds the cup completely upside down and the water does not fall out of the cup. The cup has no lid and the water is not frozen. How is this possible?



The answer will be released in next months newsletter!

If you would like to submit a logic puzzle for future newsletters, send it to orret.deborah@pusd.us!

07 // Credits & Contact

the girls that made this newsletter possible

Emma Hungerford, 10th Grade

Violet Chandler, 10th Grade

Madeleine Lees, 10th Grade

Jaidyn Carrol, 10th Grade

Morgan Gaskell, 10th Grade

Celeste Acosta, 10th Grade

Ruby Chew, 10th Grade

Cecelia Bichete, 10th Grade

Mallika Sheshadri, 9th Grade

Gianna Gullon, 9th Grade

Maxine Scott, 9th Grade

Ms. Orret, Advisor

& everyone else on The 28% team!

have a question? want to get involved? want to be featured on the newsletter?

Email Ms. Orret!

orret.deborah@pusd.us

