

The 28 Percent

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



Created by Camila Matthews

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ADA LOVELACE DAY

Ada Lovelace:

The First Computer Programmer

Ada Lovelace, born Augusta Ada Byron in 1815, is widely recognized as the first computer programmer, an extraordinary achievement for a woman in the 19th century. Daughter of the famous poet Lord Byron, Ada was raised by her mother, Annabella Milbanke, who emphasized mathematics and science in her education to counterbalance the artistic temperament she believed Ada inherited from her father. This unconventional education for a woman at the time allowed Ada to engage deeply with the emerging field of computational machinery.

Ada Lovelace's most notable contribution came from her collaboration with Charles Babbage, an inventor and mathematician who designed the "Analytical Engine," an early conceptual model of a mechanical computer. While Babbage is often credited with designing the machine, it was Ada who realized its broader potential. In 1843, Ada translated an article about the Analytical Engine from Italian to English, adding her own detailed notes, which ended up being longer than the article itself. These notes included the first algorithm intended to be processed by a machine, earning her the title of the world's first computer programmer.

Ada Lovelace Day

Ada Lovelace Day, celebrated on the second Tuesday of October each year, honors Ada's pioneering work and highlights the achievements of women in STEM (Science, Technology, Engineering, and Mathematics). The day was founded in 2009 by Suw Charman-Anderson to raise awareness of the underrepresentation of women in these fields and to celebrate female role models who inspire future generations.

Ada's legacy is a powerful example of how passion and curiosity, regardless of gender, can lead to groundbreaking achievements that shape the future.



Birds The Nomads of the Night

written by Paulina McConnell

Can you imagine waking up at 1:00 a.m., scarfing down a meal, and setting out to travel 130 miles in one night? Believe it or not, this is the reality for millions of birds in North America each midnight.

Guided by nothing but the light of the moon and the stars, over 500 species make these nighttime treks across the continent every night in spring and fall. Nocturnal flight is a significant part of the broader migration that over 70% of bird species make each year. In search of food, the coziest habitat, or the perfect spot to settle down and breed, some species can travel up to 60,000 miles by wing in a single season, as is the journey of the sea-dwelling Arctic Tern. The Arctic Tern draws an itinerary from the tip of Antarctica to the North Pole - a 24-hour flight by airplane, done in three months of ceaseless flapping and soaring. It's well-documented that the typical Arctic Tern flies a distance of three trips to the moon - and back - in its lifetime.

So migrating birds fly. A lot. Why at night?

Most of our night-wandering wonders are smaller, land-based species such as warblers, thrushes, vireos, flycatchers, and sparrows. Under the dark disguise of the night sky, these prey species can avoid being spotted by daytime predators - things like falcons and hawks. Interestingly enough, ducks and sandpipers are also frequently documented night-fliers.

Aside from avoiding predation, there's evidence that birds feel more confident navigating at night, using the orientation of the stars as an advanced compass. This is one reason why urban residents are often asked to shut off their outdoor lights when they go to bed, as any escaped light can distort the birds' view of their astronomical map.

The cool night air also gives migrating birds a leg up in their travels. Flapping their wings at speeds averaging 30 miles per hour, it's no wonder that these avian athletes prefer to be out of the sun for such an energy-consuming task. And like temperature, wind intensity is generally lower at night, which makes for smooth sailing.



In the last few decades, ornithologists (bird scientists) have only just begun to detect the vocalizations of these night nomads. Night flight calls - affectionately known as NFCs by birders - are performed at a frequency and amplitude nearly indiscernible by human beings. Some last for less than one-twentieth of a second, with the majority of calls hovering around a half-second long. Ornithologists are working to uncover what types of messages can be encoded in such a short tweet.

How does night migration look in Pasadena?

Well, as I write this article on October 6th, an estimated 130,400 birds crossed our corner of the sky - Los Angeles County - just last night. According to Birdcast, a public site by the Cornell Lab of Ornithology, migration peaked at around 9:50 pm. Most birds flew at around 26 miles per hour in the Southeast direction, migrating toward warmer southern climates in Mexico as cold autumn nights approach. A quick glance at the moon tonight might reveal species such as the mohawked Western Wood-Pewee, the tiny Willow Flycatcher, or even the Red-Necked Phalarope, an elegant resident of coastal lagoons.

So night migration is happening - right now, and right here. Turn out your lights as you sleep tonight to make this hundred-mile marathon just a bit easier for these tiny, resilient, winged wonders.



Endangered Species Spotlight: Giant Oceanic Manta Ray

written by Kaley Simkins

The Giant oceanic manta ray has the largest brain of any fish studied by marine biologists so far, showing exceptional memory and object recognition. This cartilaginous marine animal is the only vertebrate with three paired appendages, possessing cephalic lobes that extend to help channel water into the mouth for feeding purposes. Up to 50% of their diet is zooplankton from the deeper mesopelagic region of the ocean. Because they are filter feeders, they passively filter the water they swim through to obtain nutrients.

Of the two largest manta species, the oceanic manta is concentrated in the open ocean, while its counterpart, the reef manta, is largely found along coastal regions. Both species, however, enjoy the tropical and subtropical ocean temperatures of 19-30 degrees Celsius. Adult oceanic manta rays can weigh up to 5,300 pounds, with a maximum wingspan of 29 feet.

These rays are highly migratory and belong to small, fragmented populations. More than 22,000 individuals have been identified, largely in the Ecuadorian region, but because of their vast global range, it is difficult for researchers to know their exact number. They are listed as endangered under the IUCN Red List and threatened under the Endangered Species Act due to their population decline of 50-79% in the last century.



The biggest threats to giant oceanic manta ray populations are commercial fishing and harvesting for international trade. Fisheries around the globe may target giant mantas for their gill plates, which are in high demand in Asian markets, most notably in Sri Lanka. They are valued for their meat and traditional medicinal purposes, such as immune-system boosters or detoxifying agents, and are sold for up to 860 U.S. dollars per kilogram. In regulated commercial fishing, they are often victims of bycatch. According to Mongabay News, 13,000 manta and devil rays are unintentionally caught and killed each year by tuna fisheries. Also, climate change is likely to affect zooplankton populations, which are fragile to temperature changes and may lead to further decline for giant manta rays. Their low birth rate of one pup every 2-3 years is unfortunately not a match for these global threats.

Since the giant oceanic manta ray is protected under the Endangered Species Act, NOAA fisheries have been tasked with developing and implementing recovery and conservation plans for the population. Through research and monitoring, the organization aims to improve global understanding of manta ray population distribution and taxonomy, as well as protect key habitat areas and breeding grounds. They will also work with the Convention of International Trade in Endangered Species of Wild Fauna and Flora, alongside other international partners, to prioritize outreach and improve the requirement of compliance among fisheries. NOAA Fisheries additionally strive to enhance the understanding of bycatch effects and investigate the best methods for safely releasing giant manta rays caught in U.S. fisheries. Lastly, giant mantas are extremely popular among scuba divers and tourists, helping raise awareness for their conservation.

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