



A little science...A touch of fiction...A lot of adventure...

News from the Den

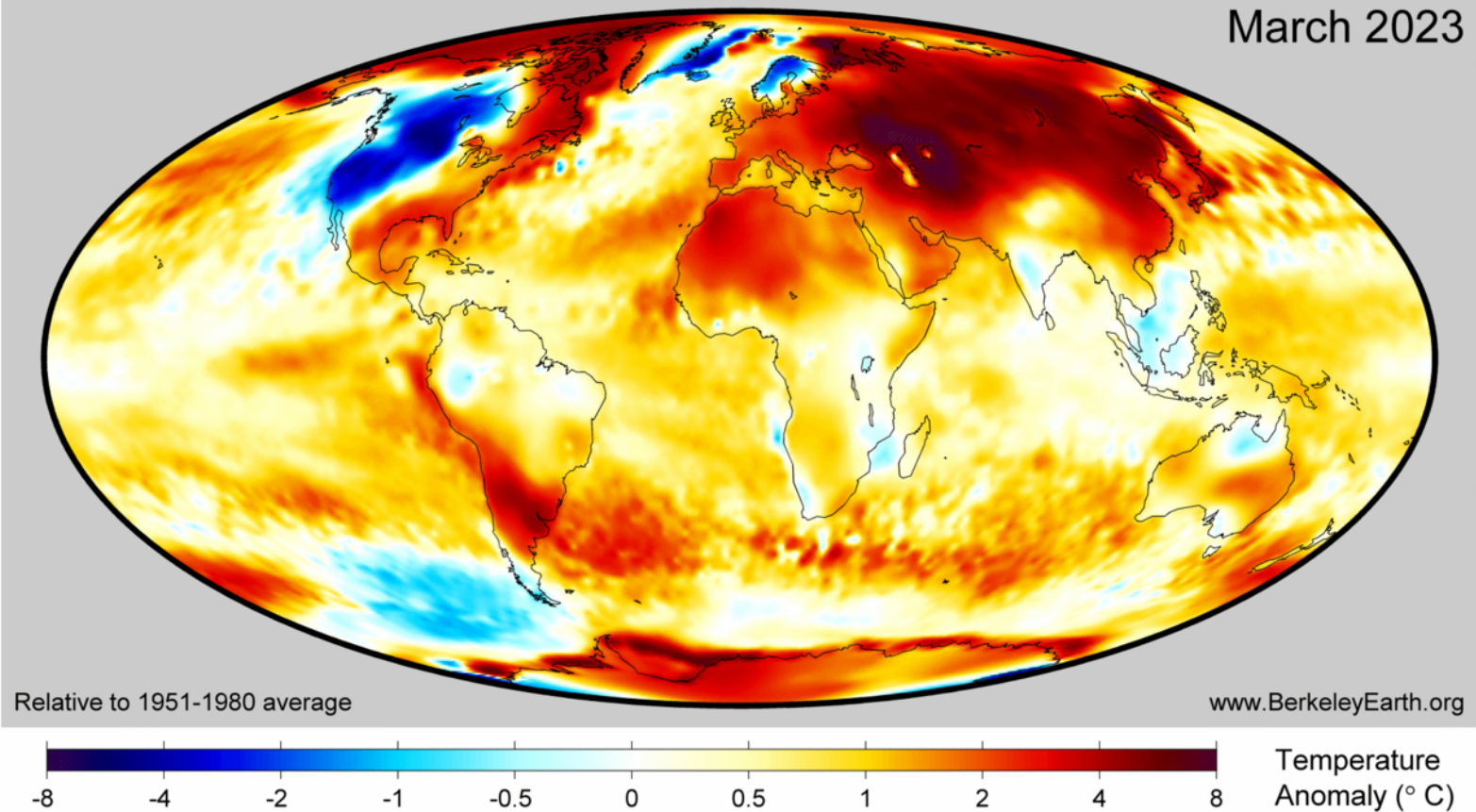
It's springtime in the Rocky Mountains. The calendar says it's May. But the trees, grass, flowers, tomatoes say it's not. Our normal rainfall for May is 1.01" per week. Last week we had 4.55" (11.557cm for those using the correct measurement system). In one week, we had 145 hours straight, without the sun shining. Highly unusual for a high desert climate.

This after a most unusual January. In January 2023 nearly 80% of the days were colder than normal and nearly half of the days in the month included at least a trace of snow. When it comes to temperatures, the average temperature for the month was 25degF (-3degC). This makes it the 17th coldest January on record.

What effect did this create? A delay in all things spring - the trees are a month late leaf-ing out, the grass didn't need cutting until the 2nd week in May, everyone is waiting to plant spring flowers and the tomato plants are still being moved from the terrace to the garage each evening due to cold nighttime temperatures.

Which Pacific Ocean current is causing this? Is it El Niño or La Niña? Ocean currents in the Pacific are shifting, driving temperatures down across the western US and precipitation amounts up. After a year and a half of La Niña, we have entered - ENSO or neutral current conditions. Our local weather is due to global climate change.

March 2023



But a change is coming and with it a rise in temperatures and a decrease in precipitation. El Niño is the warm phase of the Southern Pacific Oscillation and is associated with a band of warm ocean water which develops in the central and east-central equatorial Pacific and rises along the western coasts of the US and South America. This current is expected to develop during June. This drives global temperatures up—in the next five years expect an increase of more than 1.5degC per year.

So, while Coloradans were shivering beneath gray cloudy days, the rest of the globe experienced its 2nd warmest March on record. And, there is a 22% chance, 2023 will beat 2016 as the warmest year on record.

Latest and Greatest - Science News

Continuing on the depressing theme from above, a question was posed in 2020: Can solar geoengineering cool the planet? NOAA (National Oceanic and Atmospheric Administration) thinks, so. Maybe? Solar geoengineering is the process of artificially increasing the reflectivity in the upper atmosphere. A highly controversial idea, as it requires adding particles to the stratosphere. In 2020, Congress directed NOAA to develop a solar geoengineering program - Earth's Radiation Budget - to determine if we could artificially increase atmospheric reflectivity with particle addition.

Scientists know natural processes produce particles: volcanic gas eruptions, industrial emissions, and oceanic microbes. Severe tropical storms then lift these particles upward. Colorado's thunderstorms can reach heights of 40-50,000 feet, providing another lifting mechanism over continents. Research now shows the massive wildfires in Siberia, Australia's outback and California in the last years create firestorms that lift soot particles into the stratosphere. These naturally-produced particles can remain there for more than half-a decade.

Last month a NOAA-modified 1960's era bomber flew at an altitude of 20km over the Arctic Circle (this is where the cooling tropical air currents fall back to earth). They measured 'old' stratospheric air and the particles it contained. They were looking for sulphur dioxide—a byproduct of natural particle decay. The aircraft's instrumentation measured SO₂ levels down to 2 parts per trillion. With these measurements, scientists can correlate naturally-produced reflectivity to how much additional particles are needed to increase reflectivity and

cool the planet. More will come of this research but the controversy still rages about this project's safety and longterm effects. See more in the article at [Science.org](https://www.science.org).

Who is sharing SARs CoV2 infections with humans? Our cats. More than 350,000 Scottish cats contracted COVID-19 and have continued to suffer from the evolving strains of this virus. The timeline for variant emergence in the cats matches human infections. Additionally, human-to-cat transmission meant our cats can catch the virus more than once. But since our feline friends don't shed viral particles easily, cat-to-human transmission was negligible. The cats also suffered ancillary results from COVID-19 infections, including COVID-heart, continued respiratory issues and COPD, and lack of eating/drinking. A cat won't eat or drink something it can't smell, so if you have COVID watch your pet for sneezing and changes in eating habits. Read more at the [Scottish Daily Express](https://www.scottishdailyexpress.com).

Who was the first victim of long COVID infection in the UK? That would be Bruce. A Glasgow couple had a mild COVID infection early in the pandemic and transmitted the virus to their cat, Bruce, an 8 year old Ragdoll. The cat stopped eating after losing his sense of smell and taste. Resulting in the need for extensive feeding-tube intervention, first through his nose and then an implanted tube in his neck. Bruce tested positive for the COVID-19-Delta variant for over a month. After 7 months, Bruce is recovering and eating again. Lesson: if you are positive for COVID, don't cuddle your pets. Dogs and cats can contract the virus from you. See the full story at the [Scottish Daily Express](https://www.scottishdailyexpress.com).

A new technological advance is creating grave concerns for the world's ethical researchers and anti-terrorism agencies. The worry: bench-top machines which can synthesize custom-designed DNA strands. Like a 3D printer, these inexpensive machines can produce customized DNA strands from 200 to 7000 base pairs (the size of a hemorrhagic Marburg viral particle). Evonetix, a device maker, states universal controls are needed to vet potential customers. In the wrong-hands, these machines are dangerous. A scary prospect for governments. But a boon for thriller authors? Just, saying. Check out [Science.org](https://www.science.org) for more.

Photos of the Month



A cold cloud of material sits at the heart of this nebula and was thought to be inert, but images from the JWST show that's not so. Most stars form from the collapse of nebular-clouds of gases and dust. To form a star, the nebular cloud expands and releases heat into the surrounding space, this loss of heat then causes the cloud to collapse. But collapse reheats the cloud. Stars are formed by a collapse-expand-collapse-expand oscillation process which condenses stellar material in clumps. Ultimately, this breaks up of the cloud, forming many small stars. Giant stars with high mass measurements are different and are thought to form by a single, sudden, complete cloud collapse. This creates a ball of material large enough for gravity to initiate fusion and the star is born in one step. A competing theory for massive star formation is core-accretion, where a small star coalesces and then absorbs other small stars into its core. Scientists argued over which model was correct.

But in the heart of a dragon, astronomers have watched the beginnings of massive star formation. The Dragon Cloud is a dense accumulation of dust and gas. It contains enough material to produce more than 70,000 suns. A number of 'quiescent, cold cores' sit near the edge of the elongated area of new star formation. There was no sign of fragmentation due to collapse-expansion oscillation in these core areas. It is hypothesized this is where a massive star will form by the core accretion model—a massive lump of stellar material is just waiting to collapse. Within the next million years a massive star should form. If we have the time to wait.



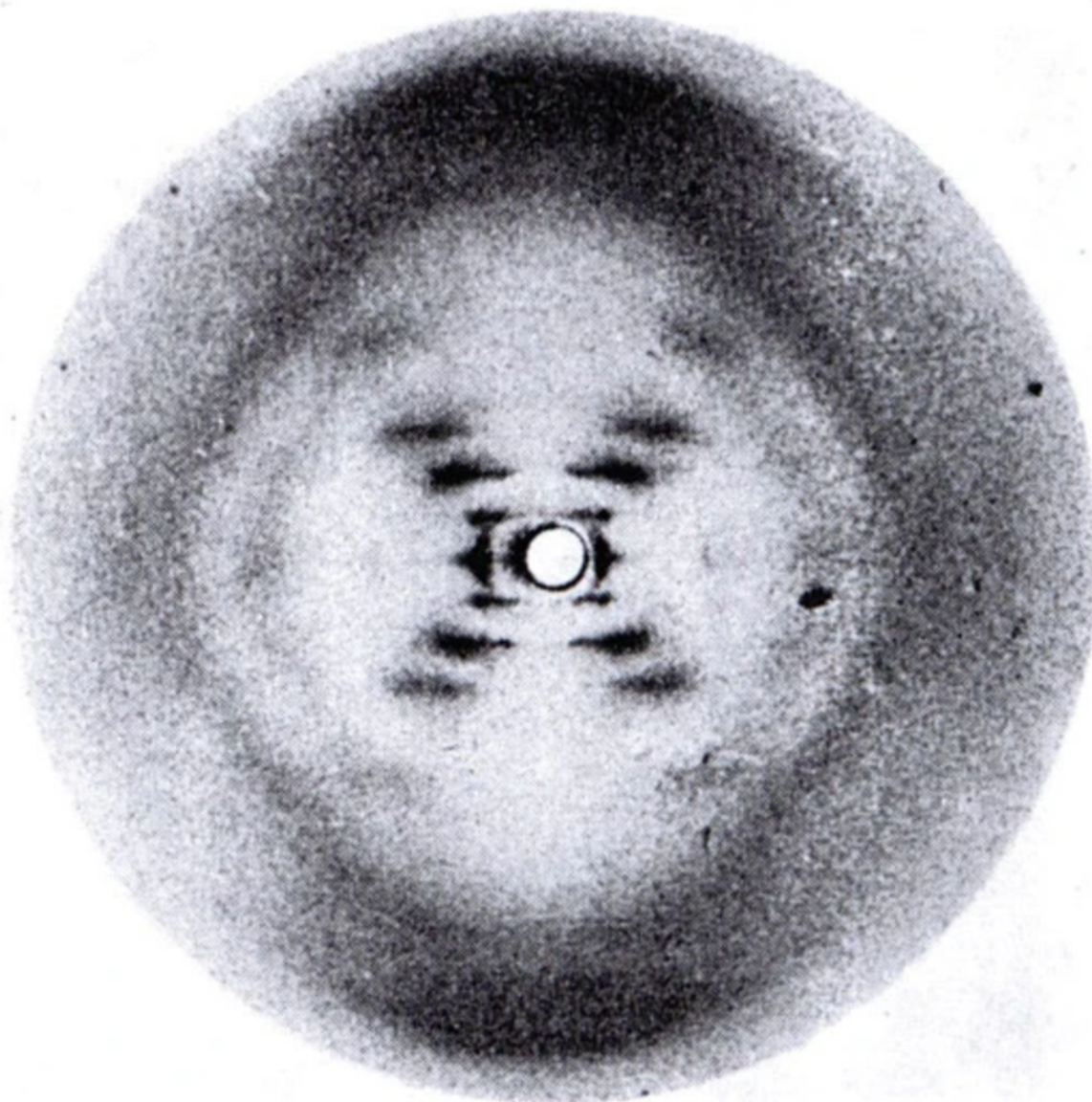
A black cucumber expels sticky tubes from its Cuvierian organ against an attacking crab.

Last month we talked about how echidnas reduce their body temperatures by blowing snot balls. This month we learned another interesting adaptation, sea cucumbers shoot sticky tubes out their butts as a protective mechanism against predators. The tubes evolve from the cucumber's respiratory system, and like lizard tails, they regenerate after use. Animals are so cool.

In Memoriam and Historical Foundations - Rosalind Franklin

One hundred years after her birth, scientists and biographers are reassessing Dr. Franklin's contribution to the discovery of the structure of DNA's double helix. In late February 1953, a 33-year old chemist working at London's King's College wrote in her notebook that DNA had two chains and it existed in two forms. She made this observation from a single X-ray photograph of the DNA crystal - photo 51(see below). This chemist was Rosalind Franklin.

Franklin died in 1958 of ovarian cancer and did not see the Nobel Prize go to Watson, Crick and Wilkins in 1962 for determining the structure of life's molecule. The DNA data and associated photo came into Watson's possession through questionable means. He admits he lifted the photo from Franklin's lab without her knowledge. Watson and Crick went on to admit they could not have built the double-helix of the DNA molecule without her work. Regardless, Franklin remained friends with both men, through the last years of her life. However, her relationship with Wilkins was a different matter, she rarely spoke to him in the two years at King's college. She is now being heralded as one of the key DNA researchers. Note: Nobel prizes are not awarded posthumously. See the full article at [Nature.com](https://www.nature.com).



J. D. Bernal, 1958. Franklin's X-ray diagram of the B form of sodium thymonucleate (DNA) fibres, published in Nature on 25 April 1953, shows "in striking manner the features characteristic of helical structures"

Book of the Month - *On the Origins of Time* by Thomas Herzog

Thomas Herzog spent twenty years with Stephen Hawkins at Cambridge University, refining the cosmologist's

seminal theory: A new vision of the origins of the universe and our place in its evolution. How life evolved from the Big Bang, or was there a Big Bang at all? Well written, this book is a thought-provoking, great read.

[On the Origins of Time](#) is available on Amazon.

Podcast of the Month - The Joy of Why by Quanta Magazine

From the question of ‘what is life’ to the discoveries of the James Webb Telescope to the question: can computers be mathematicians, this bi-monthly podcast has it all for the nerds in the world and everyone else who is just curious about the world we live in, how it works and how we quantify it.

Check out the [podcast](#).

Minutiae

Things are cranking along in the Den. QT is coming along. Spring will arrive eventually in the Rockies. And another Denver sports team has made it to the playoffs - GO, Nuggets.

Stay curious. Be kind. CA



keep being curious

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