

## A guide to my Science Digest spots on NPR

Since 18 December 2018, with time off on Christmas, I've been doing 90-second spots, *Science Digest*, on KRWG-FM, our local NPR station in Las Cruces, NM. I've made an index here so that you can replay them (and, in some cases, get the advance version). I thank KRWG and, especially, Fred Martino, for giving me the opportunity to have these on the air. They're great fun to make.

Find your topic – follow the links, or do your own search with good old ^F. The links right below here take you to a summary; from there, you can link right to the audio file.

To get back to the top or wherever you were before you clicked on a link, hold the **Alt** key and hit the back arrow (←) key

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**Science meets technology and politics** – regulating high tech; [pitfalls](#) // [\(un?\)sustainable](#) use of materials // [Albatrosses find illegal fishing](#) //

Science Digest segments, in chronological order, until number 68:

18 Dec. 19 Flu vaccines from llamas?

[Llamas get the flu, too.](#) Their tiny antibodies may be key to making a flu vaccine that protects us against many strains.

1 Jan. 19 Stellar catastrophes made us

Stellar catastrophes gave us [almost every element in our bodies](#), plus radioactive elements that heat our planet to help give us fertile soils (indirectly!). Hydrogen, however, is 13.8 billion years old.

8 Jan. 19 How's your standard kilogram?

[The metric system revitalized scientific measurement.](#) It was first based on physical objects, such as a rare metal standard meter. Now it's based on fundamental constants that any lab anywhere can reproduce.

15 Jan. 19 [Australia, so old it's deficient](#)

The newest land in Australia is still 220 million years old. So much of Australia has lost key nutrients for plants and animals over time; it's a case study in mineral deficiencies and plant adaptations to them.

22 Jan. 19 [First CRISPR-edited baby](#)

A scientist in China genetically edited an embryo that became a baby. The ethical and scientific shock waves went around the world. For many reasons, it was the wrong thing to do.

29 Jan. 19 Comb jellies and independent evolution of nerves

These [exquisitely beautiful, simple animals](#) illustrate that their nervous systems took a different branch from ours. Cells that made a glue-like substance evolved into nerves!

5 Feb. 19 [Big impactors – Earth vs. Moon](#)

Areas on Earth have been hit by meteors big and small, just like the Moon. Land renewal down here erased most craters, but the history of big impactors is still daunting.

12 Feb. 19 Global cooling

While we're warming the Earth alarmingly, it had been cooling the last few million years.

[Mountains that arose in beautiful Indonesia](#) have been weathering and taking CO<sub>2</sub> from the air!

19 Feb. 19 Mutations in our esophagus – natural selection

All our cells don't have the same DNA; different mutations accumulate. In our esophagus, a hot spot for that, we end up with [lots of different patches](#) but only 1% progress to cancer, luckily.

26 Feb. 19 [Grazing the Sun](#)

The Parker Solar Probe is going 95% of the way to the Sun to explore. How can it survive the intense solar radiation? Clever engineering, and a (fairly) fast fly-by.

5 Mar. 19 [Plant roots sense water](#)

Plants can't move, so putting roots in the best places to find water is critical. They've been found to have sensitive proteins that start a cascade of growth responses to get to the best places.

12 Mar. 19 Lefties

Left-handers face some discrimination and have more physical problems than righties. Why hasn't natural selection eliminated left-handedness? [Lefties have been better fighters.](#)

19 Mar. 19 Origins of life on Earth

- [No one was around 3+ billion years ago](#) but we have lots of information about how it likely happened. One new piece: the collision that made our Moon likely gave us a good atmosphere!
- 26 Mar. 19 Careers in science  
[Practice hard for a 1 in 10,000 chance of a pro sports career](#), or save your knees and head for a much likelier career in science, and the rewards are many, beyond even money.
- 2 Apr. 19 [Keeping warm on Mars](#)  
Getting to Mars is hard, keeping warm there is very hard. Now there are special materials that can gain the wimpy solar heat and keep it... though a 9-month dust storm might end that.
- 9 Apr. 19 Peanut allergies  
These allergies are life-threatening for many people. The immune system makes antibodies for many protective functions but also bad reactions. [We might genetically engineer them!](#)
- 16 Apr. 19 High-altitude pseudosatellites  
Satellites high above the Earth are cool for monitoring so many things, but [high-flying solar-powered planes](#) could do an even better job for detailed, very frequent looks at the Earth.
- 23 Apr 19 Earth looks like a liquid drop  
The Earth spins and pooches out at the equator, [just as if rock is a liquid](#)... and so it acts at long times. We can calculate the shape as if the Earth were water, and also why you weigh less at the equator
- 30 Apr 19 [Psychotic computer](#)  
Calvin and Hobbes wondered what's left for humans when computers do other jobs better than humans. They could be better at being psychotic! There is a worry about robotic fighters.
- 7 May 19 Striga  
[Three hundred million people in Africa](#) face crop failure from a terrible root parasite of sorghum. Relief may come from using tiny amounts of chemicals that trick *Striga* into committing suicide.
- 14 May 19 Thalidomide and Frankie Oldham-Kelsey  
Frances Oldham Kelsey was [a federal bureaucrat to thank](#). At the Food and Drug Administration she refused, for excellent reasons, to allow thalidomide to be sold in the US.
- 21 May 19 [A carcinogen in flour](#), with a purpose  
Bromate in flour in the US – it strengthens flour...and is carcinogenic on its own, but on baking it gets reduced to harmless bromide.
- 28 May 19 Taste in tomatoes – inactivating a gene, unfortunately  
Tough, red tomatoes have little taste. Now researchers know the identity of a gene that got accidentally turned off ; it might be [restored to give us back the flavor](#).
- 4 June 19 Vaccines lose out over time  
[Vaccines may lose effectiveness](#) faster than we thought, even good old yellow fever vaccine. Still, getting a flu shot that protects you incompletely can save you some misery, or your life.
- 11 June 19 [Radioactivity in my veins](#), purposefully  
Technetium, element 43, is so radioactive that it proved impossible to find in nature till recently. Still, its predecessor can be made in nuclear reactors... for 10 million medical images each year!
- 18 June 19 Need for sleep, even half a brain at a time  
Sleep physically clears your brain and even keeps you alive. How can animals such as dolphins, who must keep swimming, sleep? [Half the brain at a time!](#)
- 25 June 19 [Adobe rains](#) and real runoff  
New Mexico is (in?)famous for tiny rains that barely wet anything. I've analyzed 10 years of rainfall records – only 14 storms hit 1 inch (25 mm) or over to feed our plants and rivers.
- 2 July 19 Collisions in the Solar System  
We owe our stabilizing Moon to a collision early in time. [Planetary "bumper cars"](#) isn't finished yet, far out near Pluto. Are we nearly through, near Earth?

- 9 July 19 Regenerating limbs – the axolotl but not us  
[The axolotl](#), a permanently immature salamander, can regenerate whole limbs; we can't do a finger. It may be because we have thyroid hormones and warm blood
- 16 July 19 [Repairing heart-attack damage... maybe](#)  
 A helpful virus can make the damaged heart make special small RNA molecules that rebuild muscle... but this keeps happening, and the pigs die of arrhythmias; not ready for prime time
- 23 July 19 You make more heat than the Sun  
 The Sun's hotter than we are, but, "[pound for pound](#)," it's easy to calculate that we produce heat at a faster rate. Good thing – that means the Sun will last so much longer.
- 30 July 19 [Are you a big corn chip?](#)  
 About 80% of the American diet comes from corn, directly or indirectly. How do we know this? By tracing the stable isotopes of carbon in our body tissues!
- 6 Aug. 19 Why is 100 km up [considered space](#)?  
 Virgin Galactic wants to call its passengers to 62 miles' altitude space travelers. Why? Winged flight stops and orbiting is the only way there. Internationally, all national air spaces stop there.
- 13 Aug. 19 Why is there pumice in Nebraska?  
[Vast deposits of volcanic ash](#) across a vast swath of the US came from an astounding eruption of the Yellowstone volcano 630,000 years ago. It might be time for a repeat!
- 20 Aug. 19 Who's afraid of the great white shark?  
 Everyone...except orcas, the [killer whales](#). Great whites fear them so much that they abandon feeding grounds before seeing them. What do the great whites sense?
- 27 Aug. 19 What is the most common protein on Earth?  
 Hint – it's not anything in humans or any other animal. It's in plants, and it does the [second-hardest biochemical reaction](#) in the world
- 3 Sept. 19 The key to science – "ignoramus"  
 In Latin, [ignoramus](#) means *We do not know*. That attitude was the key to breaking out from dogma and tradition. Yuval Noah Harari made the clear case!
- 10 Sept. 19 pp. S12-14: The importance of forgetting  
[If you can't forget you suffer](#), and you may be pretty mediocre at many tasks. Some people who remember their lives poorly are hard to distract and do jobs well that require novel thinking .
- 17 Sept 19 Cholesterol – and the brain  
 No cholesterol? You're dead, or, were never born. It's critical in all cells and especially in the brain. [It has to be replaced](#) as it can go "rancid," and now we've found how it gets recycled
- 24 Sept. 19 The heat that stays  
 Burn some ordinary fuel and you release heat. You also release carbon dioxide, and that traps heat for [85 times more degree-days](#) than the initial "fire."
- 1 Oct. 19 3. Hazards of spaceflight  
 Face it, we evolved for Earth's gravity and radiation shielding. Long space travel has many [adverse physiological effects](#). A trip to Mars will also stress our psychology enormously
- 8 Oct. 19 Chip in your brain  
 Some cases of epilepsy or mood disorders are being treated with computer chips to or even in the brain. Do you lose some key emotional control? [Can your brain be "hacked?"](#)
- 15 Oct. 19 Honeymoon on Venus  
 Venus, goddess of love, but a planet of hellish temperatures... but up to 715 million years ago it may have harbored the [first life in the Solar System](#)!
- 22 Oct. 19 Isotopes in fossilized teeth

Isotopes of the same chemical element react at rate that differ by tiny amounts, but finding isotope ratios tells us so much. In [teeth of a 2-million-year-old hominid](#) they tell of hungry times.

29 Oct. 19 What happened to malaria

[The US had malaria until 1951](#), the last bit in Farmington, NM! One little-known weapon was window screens. Malaria is likely to come back, for a number of reasons – hang on.

5 Nov. 19 High-fructose corn syrup and flavorists

A penny saved for beverage companies but [bad for your health](#). Sugar has its problems, too ; why do we eat so much? Can't stop eating other processed foods? It's the flavor researchers.

12 Nov. 19 Fossil-fuel energy in biking

[Riding a bike still uses fossil fuels...](#) in growing, processing, and transporting the biker's food. Still, it's only about 1/8 as much as fuel use in driving a car. Pile 8 people into a van!

19 Nov. 19 [Sweat](#)

We sweat, horses and dogs don't. It's why we can ultimately run down a horse. It's also why you shouldn't shave your dog in summer. Also, wear long sleeves and pants in the sun.

3 December 19 [Can trees save us?](#)

There are major research and pragmatic efforts to plant trees to take up CO<sub>2</sub> and mitigate climate change. The limitations are striking, pointing to the need for complementary approaches.

10 Dec. 19 [Colonizing Mars](#)

Elon Musk proposes some methods and reasons to colonize Mars. His look at a "race" between biological and stellar evolution is intriguing. His hope for the human species to last far longer than 2 million years is misplaced.

(These next 10 have no definite order on KRWG, so I made up one)

17 December 19 The humble [creosotebush](#)

The odor of its wet leaves is captivating. Its resins are both useful and toxic. Its tolerance of water stress is unmatched, and it comes from the ability to keep water under fantastic tensions.

24 December 19 [Light as a wave](#), and a particle

Light acts clearly as a wave, giving us both blue butterflies and gravity-wave detectors. It also acts as a particle, a bunch of energy. So do electrons and even molecules!

31 December 19 [Why are plants green?](#)

I look at the physical behavior of the molecules – the kind of light it must absorb (right energy level) and the way it handles that light with internal processes, unmatched by other molecules

~~24 December 19 – I think this is a pass~~

**NEVER RAN** Quantum computers vs. Ewin Tang

Heavy investors are hoping that quantum computers can be made that vastly outperform classical computers. Undergraduate computer science major Ewin Tang gives the edge back to the classical!

7 Jan. 20 [Bacterial defenses](#)

Bacteria have to contend with other bacteria and with viruses. One of [two different defenses](#) against hordes of viruses works well when other bacteria are absent, the other when other bacteria are present...and then the bacterium is more virulent toward us!

14 Jan. 20 The [r-process](#) in stars and us

Almost unthinkable conditions in exploding stars and in neutron star mergers have provided us with chemical elements we need in our bodies. Now their creation [has been imaged, in a way](#).

21 Jan. 20 Regulating high-tech - [pitfalls?](#)

The US government broke up monopolies, including AT& T and its Bell Labs that created so much technology. Other US companies could use the technologies but the Japanese used them even better. Tread carefully, regulators.

28 Jan. 20 Breast milk and obesity

Breast milk has many nutrients, as well as [small molecules](#) that train our immune systems as infant so that we don't become obese later.

11 Feb. 20 Growing ancient bacteria

The [Archaeobacteria](#) from strange places hold clues to our own evolution with cells having nuclei. They are extraordinarily difficult to grow in the lab but a 12-year effort succeeded in growing one that may be right on our evolutionary track.

18 Feb. 20 Sustaining our use of materials

Energy and climate issues have potential technology-by-political solutions but not yet our [extravagant use](#) of materials. Become part of the solution!

25 Feb. 20 [High fructose corn syrup](#) and evolution.

Why do we crave sweet fruits and honey, laden with the same fructose/glucose mix as in the notorious HFCS? Until recently, being fat, seasonally, was adaptive. Oh, and there's a weak link to cancer.... that concerned almost none of our ancestors.

3 Mar. 20 [Snowball Earth](#)

Two, four time, or more, Earth almost froze over, or did so. The cyanobacteria that gave us our start with oxygen triggered these events, oxidizing away a comfy greenhouse effect.

10 Mar. 20 [Archaeobacteria and us](#)

(OK, us → we, grammatically) Unusual bacteria-like organisms first distinguished from common bacteria 2 years ago lie at some critical juncture in our evolution. Japanese researchers cloned a very special one whose genes may show that we came from these Archaeobacteria.

17 Mar. 20 [Malnourished children may thrive now](#)

Severely malnourished children now can survive, but many don't thrive, years after rescue. Maturing the bacterial ecosystem in their gut with a simple, cheap food supplement can restore these children. Kudos to the nth.

24 Mar. 20 [Earth's heat sources](#)

Wimpy at the surface, Earth's four major heat sources keep the mantle deep below us churning. That made our continents and renews our landscapes... and it has caused mass extinctions. Our ancestors somehow survived, as did some dinosaurs flying around us now.

31 Mar. 20 [Relativity and black holes](#)

Einstein pulled ideas together with stunning imagination to give us special and general relativity that explain so much. Last year relativity was tested at its most extreme case, a black hole 318 quintillion miles away. A black hole looks the way his equations predict!

7 Apr. 20 [Why does covid-19 spread so fast?](#)

We're stunned by the rate of spread of the pandemic. The virus appears different from other coronaviruses in its spike protein for attaching to our cells.

14 Apr. 20 [Electronic insects](#)

Unswatatable crawlies? They're electronic, amazingly simple, and may be developed to explore places we can't go, including insect colonies for a detailed look, or a hazardous place. Simple nervous systems in real insects hint that extended simplicity may work very well.

21 Apr. 20 [Covid-19 evolution is slow](#)

Diseases mutate, with influenza as a textbook case. Mutations can make a disease more virulent but harder to spread (infected individuals are out of action faster) or vice versa. COVID-19 is mutating nice and slowly. Controlling the spread now is up to us to do better.

28 Apr. 20 [Fuzzy, deaf moths](#)

Bats prey on moths. Some moths hear the bats' chirps and take evasive action. Other moths evolved fuzz that deadens the reflection of the sonar pulse to make it harder for the bats.

5 May 20 [Cecilia Payne, persevering astronomer](#)

She was the first woman to get a PhD in astronomy from Radcliffe College, then a part of Harvard. With sophisticated and painstaking work, she discovered that stars are mostly hydrogen. It took male astronomers some years to catch up!

12 May 20 [Albatrosses and illegal fishing](#)

Many fish populations are under extreme pressure from human overfishing. Illegal fishing is a major part of the problem. One help: let giant albatrosses find the fishing boats and report the location, with radar detectors and GPS.

19 May 20 [The drying of the Colorado River](#) – a hot clue

Seven US states, Mexico, and 16 million jobs are tied up with the shrinking flow. An analysis that adds the physics of sunlight disposition reveals that climate change has reduced and is reducing the reflection of sunlight, leading to more evaporation of water.

26 May 20 [Picking out voices in a crowded room...](#) or not.

With age or hearing loss we find it hard to follow one person's speech in a group. Virginia Best and colleagues find that we use redundant information in hearing to separate voices, something we can't do when we lose sensitivity to higher frequency bands.

2 June 20 [Spreading COVID-19](#)

People without symptoms likely spread 79% of the cases in China before the lockdown! A detailed analysis of people's movements informs this estimate. How should states protect their citizens?

[9 June 20] [Stellar mathematician](#)

Katherine Johnson was a child prodigy who made it from segregated West Virginia to NASA. John Glenn wanted her OK to trust his orbital flight. She lived to be 102, serving at NACA and NASA for 34 years.

[16 June 20] [Drones and insects](#)

Drones from huge to tiny have been made. Tiny drones have promise for some uses but they're hard to make effective. Insects have to do many drone-like tasks; they evolved to do it with materials that each do multiple tasks.

[23 June 20] [Presolar dust grains](#)

More than 2 billion years before the Sun and the planets formed, there was cosmic dust. Some tiny particles got trapped in a meteor that fell to Earth in 1969. With extremely fine techniques, geologists proved their age from remnants left by cosmic rays hitting the particles.

30 June 20 [WEIRD people](#)

Psychology researchers find it easy to recruit as study subjects their students who are largely **W**hite, **E**ducated, **I**ndustrial, **R**ich, and **D**emocratic - WEIRD. These students are more independent, trusting, and nonconforming. The Catholic Church seems to have had a role.

7 July 20 [Surprising Sun?](#)

The Sun is stable, reliable. Will it stay that way? A survey of 369 stars like the Sun shows that some are notably variable. The Sun has been stable for at least 9,000 years, but can it vary a lot?

14 July 20 [Stop that jaw...fast!](#)

It's a bit shocking and painful to clack our teeth together when a hard nut gives way as we're chewing. We evolved the fastest reflex in our bodies, with a delay of just over one thousandth of a second to keep it from happening.

21 July 20 [Matter and antimatter](#)

The Big Bang should have made equal amounts of matter and antimatter, which should have annihilated each other, leaving no matter. Why didn't they? A look at neutrinos gives us a clue.

28 July 20 [Automatic color balance fooled](#)

Our brains automatically account for different color balance in different kinds of light – sunlight, shade, candlelight. The mineral alexandrite, however, fools us so that we see it vibrant green in sunlight but ruby red in candlelight.

4 Aug.20 [Mosquitos and their heat sensor](#)

Long ago, the common ancestor of fruit flies and mosquitos evolved heat sensors, originally to avoid heat. Mosquitos the evolved a different use of the sensors: find us by the increase in temperature near us.

**To be scheduled:**

[Amyloids and prions, and memory](#)

Amyloid plaques and prion diseases are bad news, but amyloid proteins bind our neurons together to preserve memories in the long term. Their behavior as prions helps keep them renewed.

#77 [Software users and addicts](#)

The software industry, particularly social media companies, has the same term as the illegal drug industry for its clients, "users." Former tech executives now share how the addictiveness of social media is engineered.

#79 [Dolphins, dry land, and technology](#)

This is enough of a teaser to leave some guessing for you. Plate tectonics that made continents eventually led to a species (we humans) with our electronic technologies, safe on dry land.