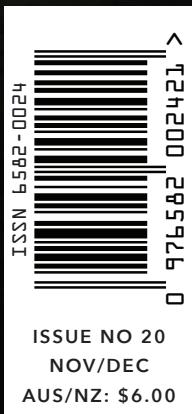


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Table of Contents



4 Saving Kakapos



5 Magnetic Proteins



6 Synaesthesia



9 Double Dipping is Gross



9 Let Fallen Leaves Lie



10 Sailing Stones



11 The Origin of OK



12 Lava Flows



13 Galapagos Islands



14 Galaxies

To survive, Endangered parrots may need to take their vitamins

KATE HOROWITZ

The Kakapo (*Strigops habroptilus*) is a curious creature. It's chubby, flightless, and nocturnal. It's the heaviest parrot in the world. It smells like flowers and honey. And, sadly, it's really, really endangered.

Only 125 Kakapos remain in the wild, living on a few small islands off the coast of New Zealand. The birds live under the close supervision of teams of conservationists who have tried for decades to help the kakapos replenish their ranks. Their efforts have met with mixed success, leaving the scientists to watch helplessly as these strange and charming birds fade away.

But there is still hope for the kakapo. One researcher thinks she may have found an answer: vitamins.

The solution is nested within the problem. The Kakapo's food of choice during breeding season is the berry of the Rimu tree (*Dacrydium cupressinum*). In good years, the rimu puts out fruit in abundance. But there have not been many good seasons lately; the trees have fruited only twice in the past 30 years.

Scientists have attempted to fill the gaps in the birds' diets with specially formulated food pellets. The kakapos seemed to like a catered meal, but they wouldn't breed after eating it. Some essential element was missing.

Previous tests of the kakapos' blood revealed that they were calcium deficient, but even calcium-enriched bird food didn't do the trick.



PHOTO CREDIT: DIANNE MASON

The solution may be simple, says Massey University nutrition scientist Pamela von Hurst. The birds just need more vitamin D.

Von Hurst and her colleagues performed a two-pronged test. First, they analysed the rimu berries. They found that the berries contain high levels of both calcium and vitamin D. Then the researchers tested the kakapos' blood. Sure enough, the parrots were vitamin D deficient.

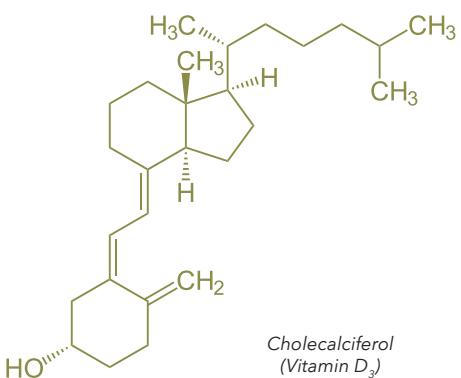
The kakapo conservation teams intend to add vitamin D to new formulations of supplemental feed. This year is also promising for rimu berries, Kevin Hackwell of New Zealand's Royal Forest and Bird Protection Society told New Scientist. "We may get as many as 25 chicks if all goes well."

- KATE HOROWITZ

"SOME ESSENTIAL ELEMENT WAS MISSING"

Vitamin D is essential for many bodily processes. Perhaps most importantly for the kakapo, it helps the body absorb calcium. Without calcium, the kakapo can't support their heavy bones or lay viable eggs. But with it, they might stand a chance.

Von Hurst published her findings this week in the *Journal of Steroid Biochemistry and Molecular Biology*.



Scientists identify proteins that align with magnetic fields

KATE HOROWITZ

Our planet and its inhabitants are shaped by countless forces, many of which we cannot see. We've gotten pretty good at understanding and even harnessing some of these phenomena. But when it comes to magnetism, there's a lot we still don't know.

For example: do the Earth's magnetic fields affect animal behaviour? And if so, how?

Call it literal animal magnetism. Magneto sensing, or the ability to detect and respond to magnetic fields, is still largely a black box to us. For years, scientists didn't believe it existed. But that's changing. Studies have shown that species as diverse as lobsters, naked mole rats, butterflies, bacteria, and birds all use magnetic information to navigate. Other animals may position their bodies or their nests along geomagnetic lines.

Whether or not magneto sensing exists in humans is a controversial subject. But scientists have recently discovered a protein complex that aligns itself with magnetic fields. They originally found the magnetic complex in fruit flies, but tests revealed its presence in a handful of other species—including humans.

The study, which was published today in *Nature Materials*, combined computer modelling with biological tests.



PHOTO CREDIT: RAZVAN SOCOL

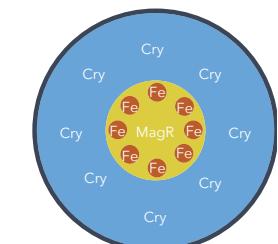
The researchers began by screening the fruit fly genome for proteins that might react to magnetic force. They found a combo. Scientists were already aware of the protein Cryptochrome, nicknamed Cry, which can detect magnetic fields. When Cry coupled with a previously unknown protein the researchers called MagR, the compound would align itself along magnetic fields.

How do our bodies use this information? That remains to be seen. The researchers describe this research as "a step towards fully uncovering the molecular mechanism of animal navigation and magneto reception."

- KATE HOROWITZ

"THE NEXT STEP WAS TO SEE IF THE SUBSTANCE EXISTS IN ANY OTHER SPECIES"

The next step was to see if the substance exists in any other species. To make a long story short: It does. The scientists found evidence of the MagR/Cry complex in pigeons. They also determined that it can form in butterflies, rats, whales, pigeons, and, yes, humans.



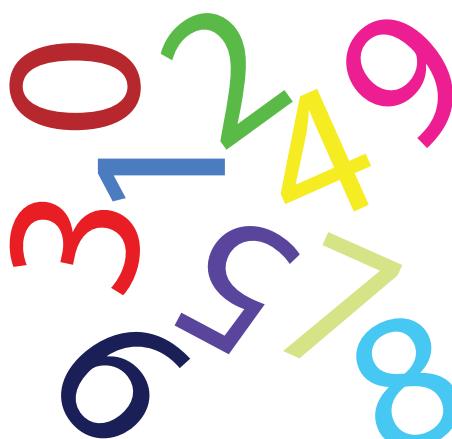
Simple diagram of the protein complex MagR is present in.

Synaesthesia: Why some of us can taste music and hear the rainbow

JANET BURNS

In recent years, you might have heard artists like Pharrell Williams and Kanye West self-identifying as having synaesthesia—something that West says has allowed him to make “sonic paintings” and “see sound.”

But just how common is synaesthesia? What is it? How does it happen? Due to synaesthesia’s relative newness as an area of study, researchers are still working to find answers.



“A BLOB OF RED APPEARS IN A ROOM OR THE SKIN GROWS HOT”



WHAT IS SYNAESTHESIA EXACTLY

Synaesthesia is a brain condition that may link a person’s senses together in an uncommon manner. For example, sounds might be heard but also seen, or flavours that can be tasted are also visualized. As the inimitable Dr. Oliver Sacks explained to American Public Media in 2009, the effect is “almost as if there’s some excessive connection, or abnormal connection between sensory areas which are normally separate.”

Every synaesthete’s experience is different, but they generally fall into one of two types: projective or associative. Projective sensory experiences seem to present tangibly—say, a blob of red appears in the room, or the skin grows hot. Associative experiences draw to mind other concepts, moods, or memories.

The possible combinations of senses and stimuli are endless, but the most common types of synaesthesia include grapheme-colour synaesthesia, in which numbers or letters bring about certain colours; chromeesthesia, in which sounds (and often music) bring about colours; spatial sequence synaesthesia, in which a person’s sense of a number is aligned in their sense of surrounding space; and number form synaesthesia, which can bring up a mental map of numbers.

HOW DOES IT HAPPEN, AND WHY?

According to research, synaesthesia is a familial trait that can skip generations, and synaesthetic experiences are “automatic.” Consistencies in this research area suggest there “is some difference between synaesthetes and nonsynaesthetes,” but that difference is still unclear. According to the 2015 research wrap-up “Developing synaesthesia: a primer,” there’s a widening spectrum of possible causes for it.

For example, the immune hypothesis, first introduced in 2013, suggests that “the interaction between the central nervous system and the immune system during early life may play a pivotal role in the development of synaesthesia.” On the other hand, the neonatal hypothesis argues that synaesthetic associations “between basic shapes and colours may be present already early in childhood” (formed, say, when you were learning the ABCs on coloured blocks as a child while your brain was still developing its sensory pathways), and that “even when these associations can be refined by experience,” they can still “interfere with learning novel shape-colour associations later.”

According to Sean Day, president of the American Synaesthesia Association (ASA), that excessive connection might be a result of small but significant anatomical differences in synaesthetic brains. Research has recently indicated that fatty nerve insulation called myelin in the brains of synaesthetes seems to be more developed along pathways between sensory areas.

Day told NPR, “Because the myelination is different, the interaction between certain parts of the brain is different.” And since this myelin sheath is good for rapid conduction of electronic impulses in neurons, it seems likely that the extra-smooth pathways between sensory areas in a synaesthetic brain make for interesting perceptual collaborations between two (or more) of our many senses.

WHO HAS IT?

Estimates about how common synaesthesia is vary, though current opinion favours the figure of around four percent of the population. Because research into the subject is limited (but increasing) and we lack a catch-all diagnostic test, we don’t know exactly how many of us are experiencing stimuli extraneously, or how common each variety of synaesthesia may be.

BBC News points out that the synaesthesia roster includes the abstract painter and art theorist Wassily Kandinsky, who communicated “his experience of seeing music in colour, line, and form.” Vincent Van Gogh and David Hockney are also among the ranks of visual artists who’ve explored the potential realms and representations of their perception in their work (and who, like Kandinsky, weren’t shy about vivid colours). Plenty of noteworthy musicians are synaesthetes, too, including Tori Amos, Jean Sibelius, Eddie Van Halen, Itzhak Perlman, and Leonard Bernstein.

“FOR THEM IT FEELS LIKE THAT’S WHAT NORMAL EXPERIENCE IS LIKE.”

WHAT'S SYNAESTHESIA LIKE?

Whether it’s seeing a patch of mauve hanging in the air during a Metallica encore or simply knowing that the number 12 is green, each synaesthete’s special sensory link is different. Pitchfork explains that, in the mind of Duke Ellington, “a D note looked like dark blue burlap [and] a G was light blue satin,” while a young Pharrell Williams saw baby blue and burgundy hues when he first heard the music of Earth, Wind & Fire.

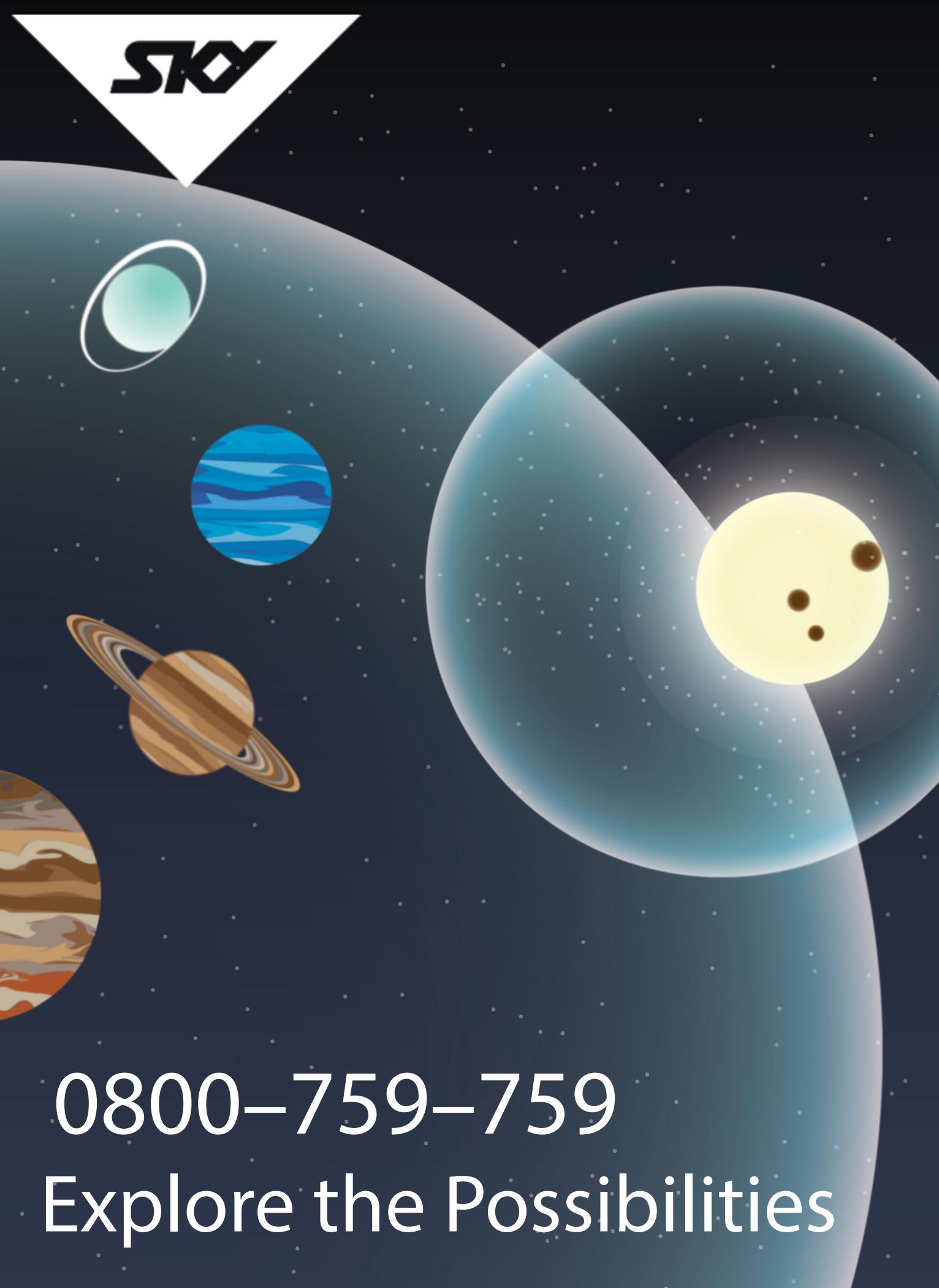
Synaesthesia researcher Dr. Carol Crane feels guitar music “[brush] softly against her ankles” and hears trumpets as they “make themselves known on the back of her neck,” she told Monitor on Psychology. Day, the ASA president, who is also a linguistics professor in Taiwan, told the publication that, for him, the taste of steak incites “a rich blue,” while steamed gingered squid “produces a large glob of bright orange foam, about four feet away, directly in front of me.”

According to Simon Baron-Cohen, a University of Cambridge synaesthesia researcher (and Borat’s real-life cousin), most people with synaesthesia are quite content with the way they experience the world. “If you ask synaesthetes if they’d wish to be rid of it, they almost always say no,” Baron-Cohen told Monitor on Psychology. “For them, it feels like that’s what normal experience is like. To have that taken away would make them feel like they were being deprived of one sense.”

The benefits of the condition might actually be measurable now, too, according to the results of a preliminary exploration by the British Psychological Association published this year. Seeking out possible correlations between synaesthesia and certain personality traits and abilities, the study found that in comparison to non-synaesthetic or “control” participants, “synaesthetes showed (by decreasing order of estimated effect size) greater absorption, verbal comprehension, visual convergent thinking, openness to experience, originality of verbal divergent thinking, and usage of mental imagery.”

For synaesthetes, that’s music to their eyes.

- JANET BURNS



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Explore the Possibilities

Scientists officially prove that double-dipping is gross

KIRSTIN FAWCETT

It's holiday party season, which means it's also cold and flu season. But will all these things collide at your company party's snack table?

Unlike George Costanza, you probably already knew that double-dipping was gross—and now, science confirms it. According to Scientific American, researchers at Clemson University once examined whether or not double-dipping actually increased the amount of bacteria in the dip.

Could your germs really migrate onto a chip and into a bowl of communal party salsa? And would different dips show varying results?

Since our mouths aren't exactly the cleanest things in the world, some of the scientists' findings weren't too shocking. Published a few years back in the Journal of Food Safety, the experiment found that cups of water that had been dipped into by bitten crackers between three and six times had about 1000 more bacteria per milliliter than the cups that had made contact with whole crackers. In a subsequent experiment, they repeated the dipping, but swapped the ordinary water out with solutions that had pH levels similar to food dips. The more acidic the solution, the lower the bacterial numbers tended to be hours later.

Unsurprisingly, bacteria numbers were much lower in non-double-dipped salsa, chocolate, and cheese dips. However, salsa that had been double-dipped took on about five times more bacteria than double-dipped chocolate or cheese. Researchers said this might be because salsa is thinner than chocolate and cheese, and might drip off the cracker and fall back into the bowl—carrying the eater's mouth bacteria along with it. Nevertheless, the salsa's acidity caused its bacterial content to eventually drop to the same levels as its party snack peers.

Bottom line? Think twice about before dunking a chip twice at your next office shindig—and hope that others are being just as considerate.

- KIRSTEN FAWCETT

Here's an excuse to not rake your leaves this autumn

KIRSTIN FAWCETT

Here's an idea: Skip raking the leaves this fall. If any neighbours complain, tell them you're just thinking of Mother Nature.



According to NZ Forest & Bird Protection Society, the leaf layer is "its own mini ecosystem." Many animals, including lizards and countless insect species live—or find sustenance—amid the fallen leaves. Butterflies and moths also spend the winter in the leaf layer as larvae or pupae. When you rake, bag, and toss the leaves into the garbage, you're ridding species of their natural habitat or food source.

Of course, your landlord might not be happy about your decision to let fallen leaves lie. In that case, you should probably give in to their requests and clear your paths, grass, and driveway. NZ Forest & Bird Protection Society recommends composting your leaves, or shredding fallen foliage with a Weed Whacker to turn it into mulch for your flower beds.

- KIRSTEN FAWCETT

Still not convinced you should shelve your rake? Leaves serve as a natural mulch, and they also fertilize your lawn's soil as they decompose.

Death Valley's mysterious 'Sailing Stones' explained

KATE HOROWITZ

It might just be the world's slowest game of Red Light, Green Light:

Huge rocks in Death Valley National Park race across the mud flats—but only when nobody is looking. The sailing stones, as they're called, mystified park visitors and scientists for decades. But one man believes he's solved the puzzle.



PHOTO CREDIT: SCOTT BECKNER

The dry lake bed known as the Racetrack playa looks much like the rest of Death Valley—cracked and dry in the summer and frozen in winter. But nowhere else in the park will you find strange tracks trailing behind each big rock and boulder. It looks as though the stones have dragged themselves through the desert, or as though they have been dragged, by some great cosmic hand.

All summer, the stones are still. Through autumn, they don't budge. Then winter roars in and creeps out. By spring, the stones have moved again.

Natural and supernatural theories have abounded: Unsurprisingly, many attributed the rocks' stealthy movements to aliens. Some said wind was the culprit; others ice; others rain; still others, mystical energy fields. Some people even steal rocks from the park, hoping to harness their magical powers.

Scientists have set up experiments in the playa since the 1940s, trying to understand what makes the sailing stones sail. But all the results have been inconclusive, and despite frequent checks, nobody has ever been able to catch the rocks in motion.

It took a space researcher to crack the case. Planetary scientist Ralph Lorenz was working with NASA, setting up miniature weather stations in Death Valley, when he first became interested in the stones. (Conditions in the park are so severe that it's often used as an experimental stand-in for Mars.) Although his original work was focused on summer in the desert, Lorenz realized his instruments would work just as well for monitoring the playa's rocks in the winter. Lorenz and his team pored over images of the stones' trails, looking for some clue.

One rock stood out. "We saw one instance where there was a rock trail and it looked like it hit another rock and bounced, but the trail didn't go all the way up to the other rock, like it was repelled somehow," Lorenz told Smithsonian.com. "We thought if there was a collar of ice around the rock, then it might be easy to imagine why it might bounce."

The final breakthrough came not in the laboratory or even in the desert, but in the kitchen. Lorenz poured a little water in a plastic container, then dropped in a small rock and put the whole thing in the freezer. When he took it out, he had a rock half-sheathed in ice. That rock went into another dish, this one filled with water atop a layer of sand. He set the rock in the water, ice side up, and blew on it to give it a gentle push. The rock floated across the water, scraping a path through the sandy bottom as it went. Lorenz had found the answer.

"Basically, a slab of ice forms around a rock, and the liquid level changes so that the rock gets floated out of the mud," he said. "It's a small floating ice sheet which happens to have a keel facing down that can dig a trail in the soft mud."

Lorenz published his findings in the *American Journal of Physics* in 2011. Once he knew what to look for, he was even able to catch the rocks in motion.

Not everybody is satisfied with the ice-raft explanation. Park visitors ask why it happens, but they don't want to hear about science, park ranger Alan Van Valkenburg told Smithsonian.com. "People like a mystery—they like an unanswered question."

- KATE HOROWITZ

What's the real origin of "OK"?

ARIKA OKRENT

"OK" is the all-purpose American expression that became an all-purpose English expression that became an all-purpose expression in dozens of other languages. It can be an enthusiastic cheer (a parking spot! OK!), An unenthusiastic "meh" (How was the movie? It was...OK.), Way to draw attention to a topic shift (OK. Here's the next thing we need to do), or a number of other really useful things. It's amazing that we ever got along without it at all. But we did. Until 1839.



There may be more stories about the origin of "OK" than there are uses for it: it comes from the Haitian port "Aux Cayes," from Louisiana French *au quai*, from a Puerto Rican rum labelled "Aux Quais," from German *alles korrekt* or *Ober-Kommando*, from Chocktaw *okeh*, from Scots *och aye*, from Wolof *waw kay*, from Greek *olla kalla*, from Latin *omnes korrecta*. Other stories attribute it to bakers stamping their initials on biscuits, or shipbuilders marking wood for "outer keel," or Civil War soldiers carrying signs for "zero killed."

The truth about OK, as Allan Metcalf, the author of *OK: The Improbable Story of America's Greatest Word*, puts it, is that it was "born as a lame joke perpetrated by a newspaper editor in 1839." This is not just Metcalf's opinion or a half-remembered story he once heard, as most OK stories are. His book is based in the thorough scholarship of Allen Walker Read, a Columbia professor who for years scoured historical sources for evidence about OK, and published his findings in a series of journal articles in 1963 to 1964.

IT STARTED WITH A JOKE

OK, here's the story. On Saturday, March 23, 1839, the editor of the Boston Morning Post published a humorous article about a satirical organization called the "Anti-Bell Ringing Society" in which he wrote:

The "Chairman of the Committee on Charity Lecture Bells," is one of the deputation, and perhaps if he should return to Boston, via Providence, he of the Journal, and his train-band, would have his "contribution box," et ceteras, o.k.—all correct—and cause the corks to fly, like sparks, upward.

It wasn't as strange as it might seem for the author to coin OK as an abbreviation for "all correct." There was a fashion then for playful abbreviations like i.s.b.d (it shall be done), r.t.b.s (remains to be seen), and s.p. (small potatoes). A twist on the trend was to base the abbreviations on alternate spellings or misspellings, so "no go" was k.g. (know go) and "all right" was o.w. (oll write). So it wasn't so surprising for someone come up with o.k. for oll korrecht. What is surprising is that it ended up sticking around for so long while the other abbreviations faded away.

THEN IT GOT LUCKY

OK got lucky by hitting the contentious presidential election jackpot. During the 1840 election the "oll korrecht" OK merged with Martin van Buren's nickname, Old Kinderhook, when some van Buren supporters formed the O.K. Club. After the club got into a few tussles with Harrison supporters, OK got mixed up with slandering and sloganizing. It meant out of kash, out of karakter, orful katastrofie, orfully confused, all kwarrelling or any other apt phrase a pundit could come up with. It also got mixed up with the popular pastime of making fun of van Buren's predecessor, Andrew Jackson, for his poor spelling. One paper published a half-serious claim that OK originated with Jackson using it as a mark for "all correct" (ole kurrek) on papers he had inspected.

OK was the "misunderestimated," "refudiated," and "binders full of women" of its day, and it may have ended up with the same transitory fate if not for the fact that at the very same time, the telegraph was coming into use, and OK was there, a handy abbreviation, ready to be of service. By the 1870s it had become the standard way for telegraph operators to acknowledge receiving a transmission, and it was well on its way to becoming the greatest American word.

- ARIKA OKRENT



TESLA

Hear the road...

not the car

