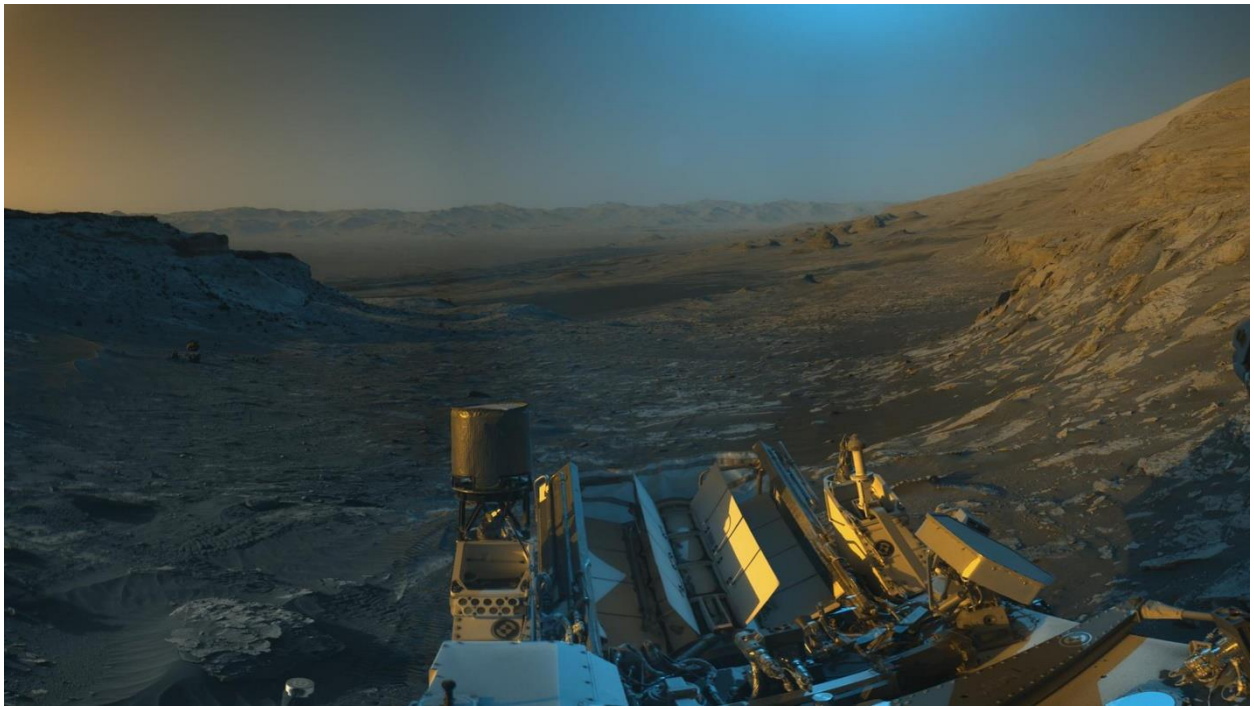
Ode to E Pluribus Unum for Sunday December 12 2021

Marscape from Curiosity's Webcams.



JPL/NASA

NASA's Curiosity Mars rover used its black-and-white navigation cameras to capture panoramas of this scene at two times of day. Blue, orange, and green color was added to a combination of both panoramas for an artistic interpretation of the scene.

On Nov. 16, 2021 (the 3,299th Martian day, or sol, of the mission), engineers commanded Curiosity to take two sets of mosaics, or composite images, capturing the scene at 8:30 a.m. and again at 4:10 p.m. local Mars time. The two times of day provided contrasting lighting conditions that brought out a variety of unique landscape details. They combined the two scenes in an artistic re-creation that includes images from the morning scene in blue, the afternoon scene in orange, and a combination of both in green.

At the center of the image is the view back down Mount Sharp, the 3-mile-tall (5-kilometer-tall) mountain that Curiosity has been driving up since 2014. Rounded hills can be seen in the distance at center-right; Curiosity got a closer view of these back in July, when the rover started to see intriguing changes in the landscape. A field of sand ripples known as the "Sands of Forvie" stretches a quarter- to a half-mile (400 to 800 meters) away.

At the far right of the panorama is the craggy "Rafael Navarro Mountain," named after a Curiosity team scientist who passed away earlier this year. Poking up behind it is the upper part of Mount Sharp, far above the area Curiosity is exploring. Mount Sharp lies

inside Gale Crater, a 96-mile-wide (154-kilometer-wide) basin formed by an ancient impact; Gale Crater's distant rim stands 7,500 feet tall (2.3 kilometers), and is visible on the horizon about 18 to 25 miles away (30 to 40 kilometers).

Mars Science Laboratory is a project of NASA's Science Mission Directorate. The mission is managed by JPL. Curiosity and its navigation cameras were designed, developed and assembled at JPL, a division of the California Institute of Technology in Pasadena.

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Metallica

was formed in 1981 in Los Angeles by vocalist/guitarist James Hetfield and drummer Lars Ulrich, and has been based in San Francisco for most of its career.[1][2] The band's fast tempos, instrumentals and aggressive musicianship made them one of the founding "big four" bands of thrash metal, alongside Megadeth, Anthrax and Slayer. Metallica's current lineup comprises founding members and primary songwriters Hetfield and Ulrich, longtime lead guitarist Kirk Hammett, and bassist Robert Trujillo.

Metallica first found commercial success with the release of its third album, Master of Puppets (1986), which has been described as one of the heaviest and most influential thrash metal albums. Their next album, ...And Justice for All (1988), was also successful and gave Metallica their first Grammy Award nomination. Its eponymous fifth album, Metallica (1991), the band's first not to root predominantly in thrash metal, appealed to a more mainstream audience, achieving substantial commercial success and selling over 16 million copies in the United States to date, making it the best-selling album of the SoundScan era. As of 2017, Metallica was the third best-selling music artist since Nielsen SoundScan began tracking sales in 1991

Enter Sandman https://youtu.be/CD-E-LDc384
The Memory Remains https://youtu.be/shk8K1v2qoQ
Nothing Else Matters https://youtu.be/tAGnKpE4NCI
Monsters of Rock—Moscow https://youtu.be/eng4OTDqtoM
Mozart Heroes https://youtu.be/UBfsS1EGyWc

Really.

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John F. Kennedy, CVN 79: The Newest Supercarrier

https://youtu.be/lwqw6DQigcU

On 15 January 2009, Northrop Grumman Shipbuilding was awarded a $374 million contract for design work and construction preparation for John F. Kennedy. On 30 September 2010, Northrop Grumman announced a new vice president for the construction of John F. Kennedy, Mike Shawcross, and that preparations were under way to begin construction.

On 25 February 2011, the navy conducted the First Cut of Steel ceremony at Northrop Grumman Shipbuilding in Newport News, signalling the formal start of construction for John F. Kennedy.

John F. Kennedy was originally planned to be completed in 2018. This was extended to 2020 after Secretary of Defense Robert Gates announced in 2009 that the program would shift to a five-year building program so as to place it on a "more fiscally sustainable path". By late 2012, delays had occurred in construction, and the Navy Department was investigating extending the construction time of both the USS Enterprise (CVN-80) and John F. Kennedy by an additional two years which could delay the carrier's entry into service until 2022.

In September 2013, the Government Accountability Office recommended delaying the detail design and construction contract for John F. Kennedy until programmatic shortfalls are sorted out. The Navy and Defense Department have rejected the recommendation. The Navy faces technical, design, and construction challenges to completing USS Gerald R. Ford (CVN-78), including producing systems prior to demonstrating their maturity to meet required installation dates. Gerald R. Ford had

costs increase by 22 percent to $12.8 billion, and additional increases could follow due to uncertainties facing critical technology systems and shipbuilder underperformance. Risk is introduced in the navy's plan to conduct integration testing of key systems at the same time as initial operational test and evaluation. One action the GAO says could be taken to ensure Ford-class carrier acquisitions are supported is conducting a cost-benefit analysis of required capabilities and associated costs.

The ship's keel was laid in Newport News, Virginia on 22 August 2015. As part of the traditional keel laying ceremony, the initials of ship sponsor Caroline Kennedy, daughter of President Kennedy and the sponsor of the previous John F. Kennedy, were welded into the ship's hull. As of late June 2017 the ship was 50% structurally complete. On 28 February 2018, Huntington Ingalls Industries announced that its Newport News Shipbuilding division had built 70% of the structures necessary to complete John F. Kennedy. On 30 April 2018, Huntington Ingalls Industries announced that she was "75 percent structurally erected and more than 40 percent complete." On 3 May 2018 Huntington Ingalls President & CEO Mike Petters reported that John F. Kennedy was to be launched three months ahead of schedule on 29 October 2019. On 30 May 2019 the 588-ton bridge and island was installed. Under the island Captain Todd Marzano placed his wings and the first Kennedy half dollar which was donated by Caroline Kennedy was put in place. Next to these Rear Admiral Brian Antonio (program executive officer, Aircraft Carriers, ret.), Rear Admiral Roy Kelley (commander, Naval Air Force Atlantic), and Jennifer Boykin (president, Newport News Shipbuilding) placed coins each embossed with quotes from President Kennedy and parts of the ship's motto. Caroline could not be present, so the order was given via radio for the crane operator to lift the island and set it down on the deck over the ceremonial items and entombing them in the ship's superstructure. The ship reached 100% complete on 11 July 2019 with the installation of the upper bow and launch deck consisting of the ships two forward catapults.

On 1 October 2019, the ship's crew was activated for the first time as Pre-Commissioning Unit (PCU) John F. Kennedy at a ceremony aboard the vessel at Newport News Shipbuilding. On 29 October 2019, Newport News Shipbuilding began flooding the dry dock where John F. Kennedy has been under construction. The process of filling the dry dock with more than 100,000,000 US gallons (380,000,000 l; 83,000,000 imp gal) of water took place over several days, and it marked the first time the ship has been in water. Once the ship was afloat, it was moved to west end of the dry dock. The ship was christened on 7 December 2019 by Caroline Kennedy, who reenacted the bottle bash she did when the first John F. Kennedy (CV-67) was christened 52 years earlier.

In November 2020, Huntington Ingalls Industries received a nine-figure modification on an earlier contract to accomplish CVN 79 "single phase delivery and Joint Strike Fighter (F-35C) capabilities" in Newport News, Virginia. According to the contract announcement, the "single-phase delivery approach" is adopted "to meet both Fleet requirements and a congressional mandate of ensuring that CVN 79 is capable of operating and deploying Joint Strike Fighter (F-35C) aircraft before completing the post-

shakedown availability as codified in Section 124 of the fiscal 2020 National Defense Authorization Act (Public Law 116-92).

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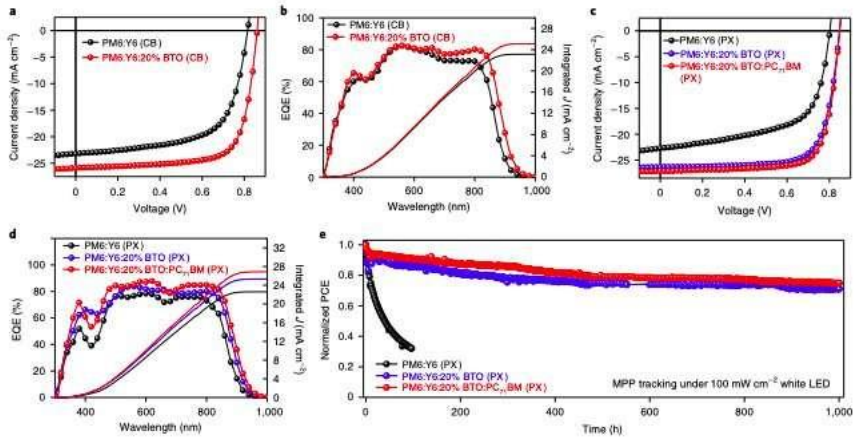
Organic Solar Cells with Efficiencies Over 17% Using Non-Harmful Solvents

by Ingrid Fadelli , Tech Xplore



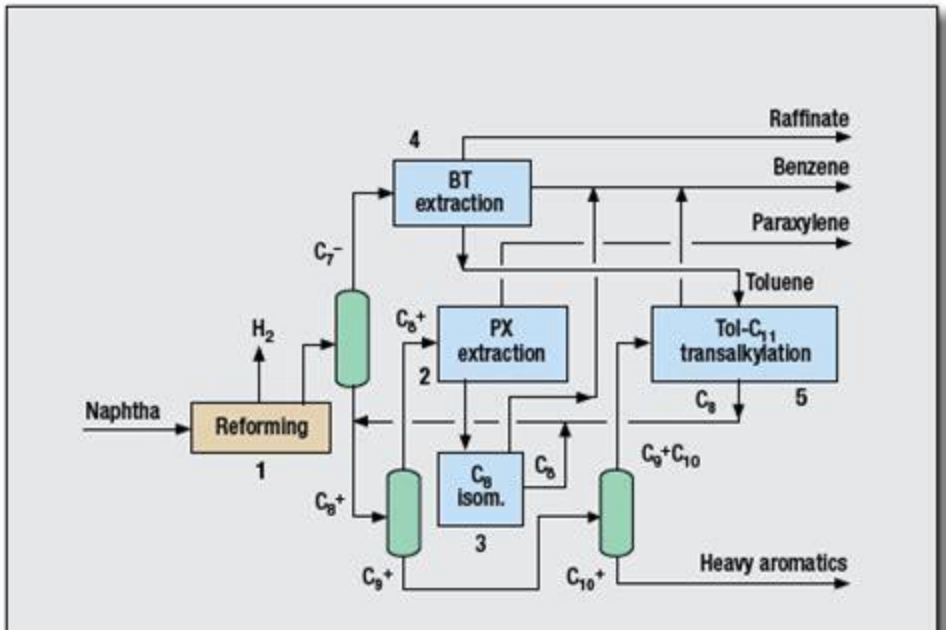
Photovoltaic performance of the organic solar cells created by the researchers.
Credit: Nature Energy (2021). Chen et al.

Over the past few years, engineers have created increasingly advanced technologies to produce and store energy more sustainably. Solar cells made of organic molecules or polymers are among the most promising sustainable energy solutions, as they are typically thin, lightweight and flexible.

Despite their advantages, most organic solar cells developed so far have low power conversion efficiencies (PCEs) of approximately 5 percent, which are significantly low compared to the 18–25 percent efficiencies of inorganic solar cells. In recent years, some engineers were able to develop organic solar cells with PCEs above 18 percent using Y-series non-fullerene acceptors (NFAs), a specific type of acceptor for solar devices.

To achieve these efficiencies, however, developers also need to use low-boiling-point and toxic solvents, such as chloroform. When these toxic solvents are substituted with environmentally friendly ones, the PCEs of organic solar cells tend to drop substantially.

Researchers at Soochow University in China, the Institute of Macromolecular Chemistry of the Czech Academy of Sciences, and other institutes worldwide have recently introduced a new strategy to create organic solar cells with acceptable PCEs using environmentally friendly solvents. This strategy, introduced in a paper published in Nature Energy, allowed them to create organic solar cells with efficiencies above 17 percent, without using solvents that are harmful for humans and the environment.



Paraxylene process
processengineer.info

"We obtain certificated PCEs over 17 percent in organic solar cells processed from a green solvent paraxylene (PX) by a guest-assisted assembly strategy, where a third component (guest) is employed to manipulate the molecular interaction of the binary blend," Haiyang Chen and his colleagues wrote in their paper. "In addition, the high-boiling green solvent PX enables us to deposit a uniform large-area module (36cm2) with a high efficiency of over 14 percent."

In addition to being more efficient than many other organic solar cells created in the past, the devices created by Chen and his colleagues have a good operational stability, which is an essential quality for solar technologies to be applicable in real-world settings. This stability is further supported by the strong molecular interactions between host and guest molecules in the cells.

The researchers evaluated the effectiveness and generalizability of their guest-assisted solar cell-assembly strategy in a series of tests and experiments. Remarkably, they found that it generalized well and could also be implemented using other 'guest' components.

"The key features enabled by our strategy, including non-halogenated green solvent processability, uniform, large-area module, annealing-free production, high efficiency and excellent stability, are among the critical requirements for the industrial development of organic solar cells," Chen and his colleagues wrote in their paper.

In the future, the guest-assisted assembly strategy could pave the way toward the development of large-area organic solar cells with high PCEs, using environmentally friendly solvents instead of toxic ones. Ultimately, this could facilitate the industrial development of organic solar cells and promote their large-scale implementation.

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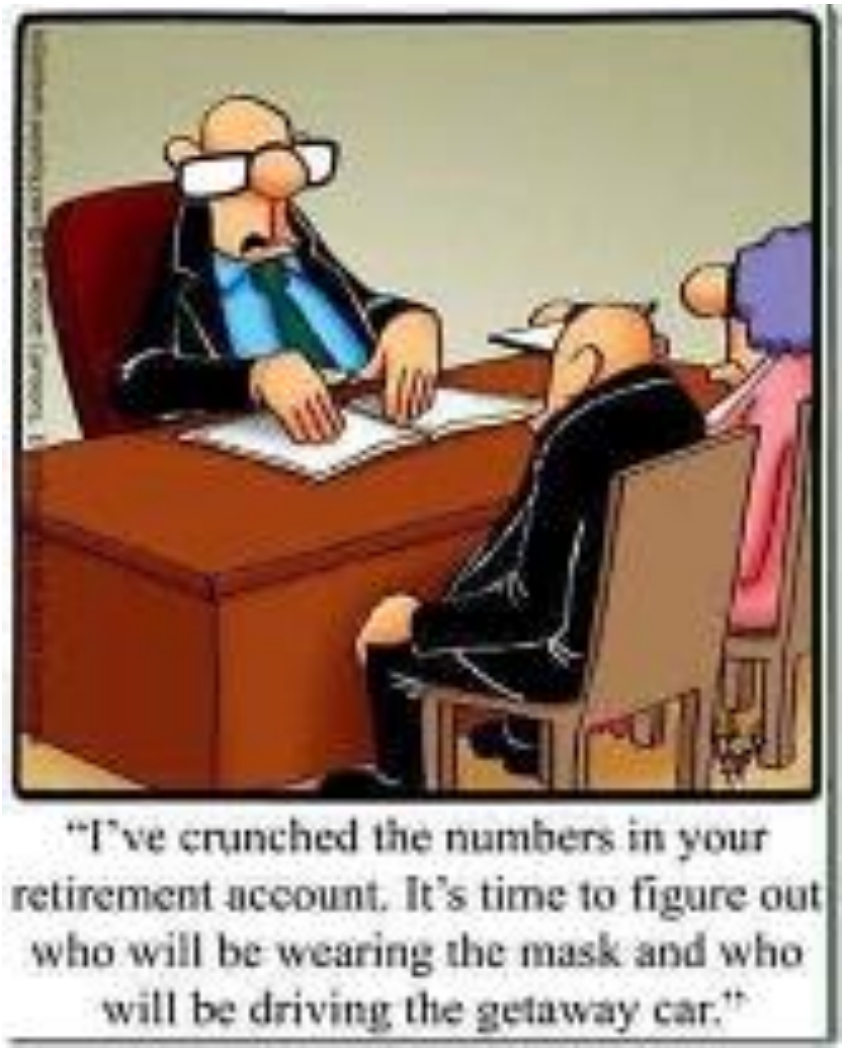

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Toccata and Fugue in D Minor by J.S. Bach
Played on the Sauer Organ of the Berliner Dom by Xaver Varnus

https://youtu.be/FHNLdHe8uxY

Xaver Varnus plays Toccata and Fugue in D minor (edited by Mendelssohn) on the great Sauer Organ of the Berliner Dom. Recorded live on the Opening Night of the "Berliner Internationaler Orgelsommer 2013".

At the time of its dedication in 1905, the great Sauer Organ of the Berliner Dom was the largest in Germany, with its 7269 pipes and 113 registers, distributed across four manuals and pedals. The court organ builder Wilhelm Sauer, from Frankfurt on the Oder, created an instrument that embodied the newest technical and musical developments of German organ building at the time. In that way, the organ met the high expectations of both the organ builder and his client: in the Protestant Cathedral of the capital city, there was to be a monumental, modern, and in every way extraordinary instrument of the highest quality. The organ of the Cathedral of Berlin represents the highpoint of Sauer's career. At the same time, it marks the end of the long development of Romantic orchestral organs, whose sound corresponds to the characteristic sound of a symphonic orchestra of that period. Today, the organ in the Cathedral of Berlin is the largest late-Romantic pneumatic action organ in the world that has survived in its original condition.

Xaver Varnus' first piano teacher was Emma Németh, one of the last pupils of Debussy. He has played virtually every important organ in the world, including those in Bach's Thomaskirche in Leipzig (2014), Berliner Dom (2013), Notre-Dame (1981), Saint-Sulpice (2006) and Saint-Eustache (1996) in Paris, National Shrine in Washington, D.C. (1985), and Canterbury Cathedral (2004), as well as the largest existing instrument in the world, the Wanamaker Organ in Philadelphia (1985).

His Quadruple Platinum Disc winning album "From Ravel to Vangelis" (SONY, 2007), is the best-selling organ CD ever. As a Canadian citizen, Xaver Varnus resides in Berlin, and in Brooklyn, Nova Scotia Peninsula, where he opened Varnus Hall in a 19th century church.

"Put simply, Varnus is a monster talent, every bit as stimulating and individual as the late Glenn Gould" (The Globe & Mail, Canada's National Newspaper). "He is one of the

most influential figure in organ music in the early twenty-first century." (Mark Wigmore, The New Classical FM, Canada).

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Flashmob Nürnberg 2014 - Ode an die Freude

https://youtu.be/a23945btJYw?t=1

Ode to Joy from Beethoven's Ninth Symphony continues to capture the hearts of people all over the world.

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Rolls-Royce's All-Electric Airplane Reaches 387.4 MPH Top Speed

It also hit altitude and average speed records, the company claims.

Steve Dent

Rolls Royce's all-electric airplane hits a record 387.4 MPH top speed
John M Dibbs/Rolls Royce

Just two months after its maiden flight, Rolls-Royce's "Spirit of Innovation" has hit a top speed of 387.4 MPH, tentatively smashing the speed record for electric airplanes, Gizmodo has reported. It also claimed the top speed of 345.4 MPH over a 3 kilometer

(1.86 mile) course and lowest time to a 3,000 meter (9,843 feet) altitude (202 seconds). The records have yet to be certified, but if the 345.5 MPH speed stands, it would beat the current record of 213 MPH — held by a Siemens-powered Extra 330LE — by an impressive 132 MPH.

Rolls-Royce (the aviation, not the car company), conducted the tests on November 16th. To have the records certified, it's submitting the trials to the Fédération Aéronautique Internationale (FAI), the body in charge of world aviation records. If confirmed, the speeds would be pretty impressive considering that the plane only made its maiden flight in September — suggesting that with more time, it could go even faster.

The Spirit of Innovation is an old-school "tail-dragger" airplane (steering at the rear) with the canopy pushed way back, and looks as fast as it goes. It's powered by a 400 kW (535 HP), 750 volt motor. Rolls-Royce said it uses the "most power-dense propulsion battery pack ever assembled in aerospace," with 6,480 cells.

As Engadget detailed in an explainer, electric airplanes aren't practical since current batteries are 50 times less energy dense than jet fuel. However, they do hold some promise for very short trips, like a 30 minute jaunt between Vancouver and Victoria in Canada. And unlike non-turbocharged ICE engines, electric motors retain full power as an airplane climbs, making them ideal for time-to-altitude record attempts — as the Spirit of Innovation has just shown.

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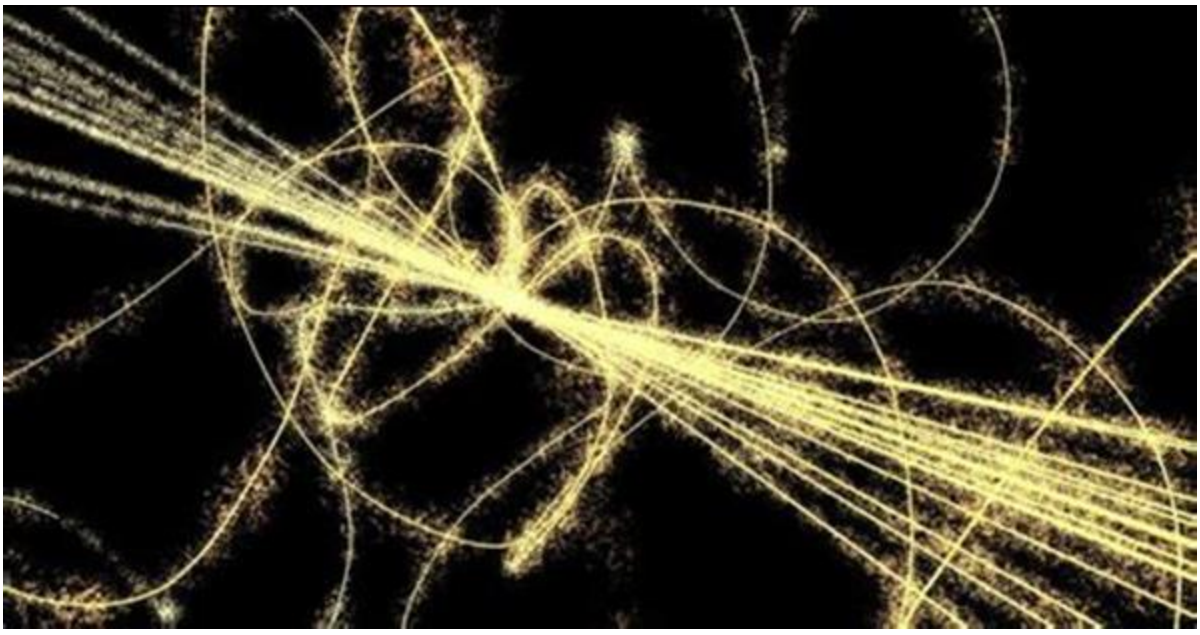
Algorithm Lets Particle Physicists Count Higher than Two

Through his encyclopedic study of the electron, an obscure figure named Stefano Laporta found a handle on the subatomic world’s fearsome complexity. His algorithm has swept the field.



When particles collide, infinitely many different sequences of events might ensue. Physicists use the Laporta algorithm to precisely predict the odds of particular outcomes.
Equinox Graphics/SPL/Science Source

https://d2r55xnwy6nx47.cloudfront.net/uploads/2021/10/Laporta_1920x1080_Lede.mp4

Thomas Gehrmann remembers the deluge of mathematical expressions that came cascading down his computer screen one day 20 years ago.

He was trying to calculate the odds that three jets of elementary particles would erupt from two particles smashing together. It was the type of bread-and-butter calculation physicists often do to check whether their theories match the results of experiments. Sharper predictions require lengthier calculations, though, and Gehrmann was going big.

Using the standard method devised more than 70 years ago by Richard Feynman, he had sketched diagrams of hundreds of possible ways the colliding particles might morph and interact before shooting out three jets. Adding up the individual probabilities of those events would give the overall chance of the three-jet outcome.

Abstractions navigates promising ideas in science and mathematics. Journey with us and join the conversation.

But Gehrmann needed software just to tally the 35,000 terms in his probability formula. As for computing it? That's when "you raise the flag of surrender and talk to your colleagues," he said.

Fortunately for him, one of those colleagues happened to know of a still-unpublished technique for dramatically shortening just this kind of formula. With the new method, Gehrmann saw terms merge together and melt away by the thousands. In the 19 computable expressions that remained, he glimpsed the future of particle physics.

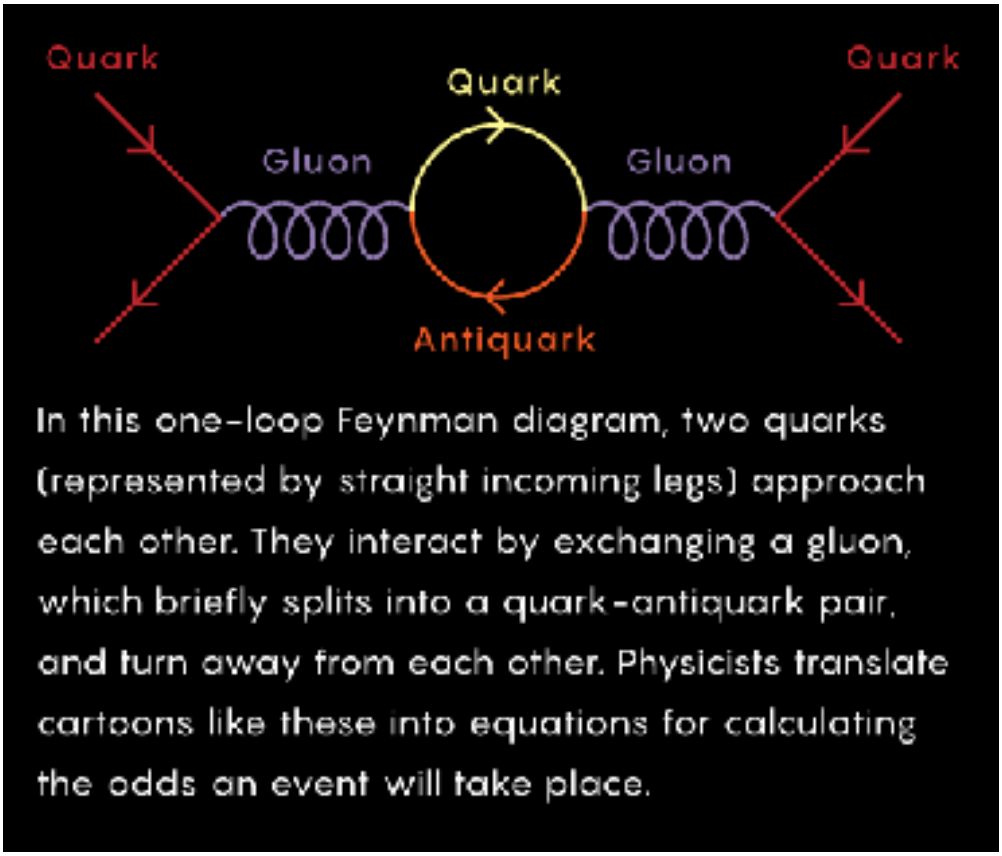
Today the reduction procedure, known as the Laporta algorithm, has become the main tool for generating precise predictions about particle behavior. "It's ubiquitous," said Matt von Hippel, a particle physicist at the University of Copenhagen.

While the algorithm has spread across the globe, its inventor, Stefano Laporta, remains obscure. He rarely attends conferences and doesn't command a legion of researchers. "A lot of people just assumed he was dead," von Hippel said. On the contrary, Laporta is living in Bologna, Italy, chipping away at the calculation he cares about most, the one that spawned his pioneering method: an ever more precise assessment of how the electron moves through a magnetic field.

One, Two, Many

The challenge in making predictions about the subatomic world is that infinitely many things can happen. Even an electron that's just minding its own business can spontaneously emit and then reclaim a photon. And that photon can conjure up additional fleeting particles in the interim. All these busybodies interfere slightly with the electron's affairs.

In Feynman's calculation scheme, particles that exist before and after an interaction become lines leading in and out of a cartoon sketch, while those that briefly appear and then disappear form loops in the middle. Feynman worked out how to translate these diagrams into mathematical expressions, where loops become summing functions known as Feynman integrals. More likely events are those with fewer loops. But physicists must consider rarer, loopier possibilities when making the kinds of precise predictions that can be tested in experiments; only then can they spot subtle signs of novel elementary particles that may be missing from their calculations. And with more loops come exponentially more integrals.



Quanta Magazine

By the late 1990s theorists had mastered predictions at the one-loop level, which might involve 100 Feynman integrals. At two loops, however — the level of precision of Gehrmann's calculation — the number of possible sequences of events explodes. A quarter century ago, most two-loop calculations seemed unthinkably difficult, to say nothing of three or four. "The very advanced counting system used by elementary particle theorists for counting the loops is: 'One, two, many,'" joked Ettore Remiddi, a physicist at the University of Bologna and Laporta's sometime collaborator.

Laporta's method would soon help them count higher.

Stefano Laporta, during a recent visit to the University of Padua, sketched some examples of the 891 four-loop Feynman diagrams that contribute to the magnetic moment of the electron.

Pierpaolo Mastrolia

Using machines to predict real-world events captured Stefano Laporta's imagination early. As a student at the University of Bologna in the 1980s, he taught himself to program a TI-58 calculator to forecast eclipses. He also encountered Feynman diagrams and learned how theorists used them to predict how the churn of ephemeral particles hampers an electron's path through a magnetic field — an effect called the electron's anomalous magnetic moment. "It was a sort of love at first sight," Laporta said recently.

After a couple of years writing software for the Italian military, he returned to Bologna for his doctorate, joining Remiddi in working on a three-loop calculation of the electron's anomalous magnetic moment, already years in progress.

Physicists had known since the '80s that, instead of evaluating each Feynman integral in these calculations, they could often apply the opposite mathematical function — the derivative — to the integrals to generate new equations called identities. With the right identities, they could reshuffle the terms, condensing them into a few "master integrals."

The catch was the infinite number of ways of producing identities from Feynman integrals, which meant you could spend a lifetime searching for the right way to collapse the calculation. Indeed, Remiddi and Laporta's three-loop electron calculation, which they finally published in 1996, represented decades of effort.

Laporta keenly felt the inefficiency of Feynman's rules when he saw the hundreds of integrals they'd started with eventually boil down to just 18 expressions. So he reverse-engineered the calculation. By studying the pattern of which derivatives contributed to the final integrals and which didn't, he developed a recipe for zeroing in on the right identities. After years of trial and error validating the strategy on different integrals, he published a description of his algorithm in 2001.

Physicists quickly adopted it and built on it. For instance, Bernhard Mistlberger, a particle physicist at the SLAC National Accelerator Laboratory, has pushed Laporta's technique to determine how often the Large Hadron Collider should produce Higgs bosons — a problem that involved 500 million Feynman integrals. His bespoke version of Laporta's procedure reduced the number of integrals to about 1,000. In 2015, Andreas von Manteuffel and Robert Schabinger, both at Michigan State University, borrowed a technique from applied mathematics to make the simplification of terms more transparent. Their method has become standard.

While Laporta's algorithm rocked the world of multi-loop particle physics, the man himself continued to plug away at the problem of the electron's anomalous magnetic moment — this time by including all possible four-loop events. In 2017, after more than a decade of work, Laporta published his magnum opus — the electron's magnetic moment to 1,100 digits of precision. The prediction agrees with recent experiments.

"It was a liberation," he said. "It was like some weight lifted from my shoulders."

A Straighter Path

Particle physicists are still grappling with the question that motivated Laporta: If the answer lies in a few master integrals, why must they slog through heaps of intermediate Feynman integrals? Is there a straighter path — perhaps reflecting a deeper understanding of the quantum world?

In recent years, mathematicians have noticed that the predictions that come out of Feynman diagrams inexplicably feature certain types of numbers and not others. Researchers initially spotted the pattern in the outputs of naïve models of quantum theory. But in 2018, they were able to find the same pattern in the digits of the

electron's magnetic moment, courtesy of Laporta. The mysterious motif has motivated researchers to seek a new way to get master integrals directly from Feynman diagrams.

Today Laporta is loosely affiliated with the University of Padua, where he collaborates with one such group of researchers attempting to make his algorithm obsolete. The fruits of their labor, he hopes, may aid his current project: calculating the next approximation of the electron's magnetic moment.

"For five loops, the number of calculations is staggering," he said.

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Football Wisdom

"Gentlemen, it is better to have died a small boy than to fumble the football"
John Heisman, first football coach at Rice

"I make my practices real hard because if a player is a quitter, I want him to quit in practice, not in a game."
Bear Bryant / Alabama

"It isn't necessary to see a good tackle, you can hear it!"
Knute Rockne / Notre Dame

"At Georgia Southern, we don't cheat.
That costs money, and we don't have any."
– Erik Russell / Georgia Southern

"The man who complains about the way the ball bounces is likely to be the one who dropped it."
Lou Holtz / Arkansas - Notre Dame

"When you win, nothing hurts."
Joe Namath / Alabama

"A school without football is in danger of deteriorating into a medieval study hall."
Frank Leahy / Notre Dame

"I never graduated from Iowa. But I was only there for two terms - Truman's and Eisenhower's."
Alex Karras / Iowa

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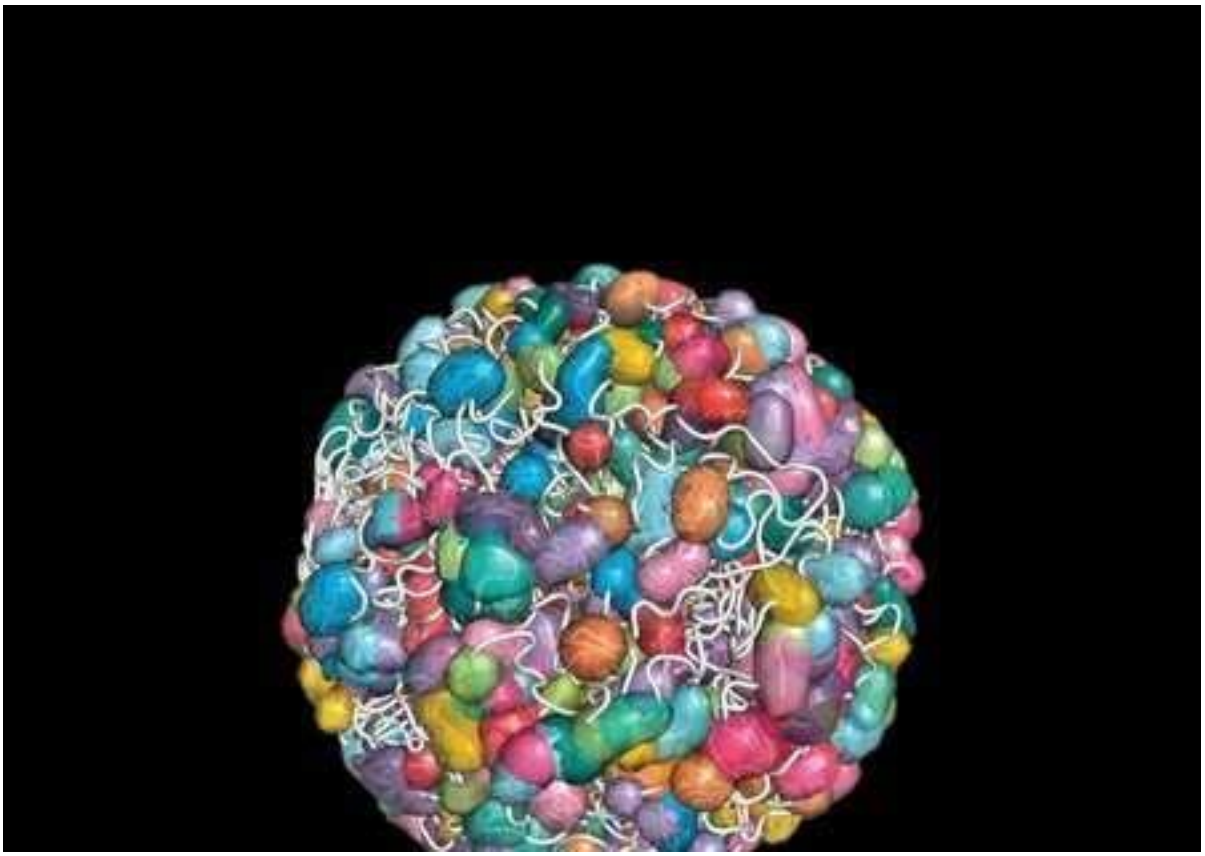
The Vast Little Library Inside Your Cells



The human genome can be thought of as a massive library, containing over 20,000 different "instruction manuals": your genes. For example, there are genes which contain information to build a brain cell, a skin cell, a white blood cell, and so on. There are even genes that contain information about regulating the genome itself—like books that explain how to organize a library. The ability to regulate gene expression—in other words, the cell's ability to turn various constellations of genes on or off—is the basis of why different cells (such as a muscle cell or a brain cell) have different forms and functions.

For any library to be useful to a reader, it needs to be organized in an easily searchable way. For example, all the books pertaining to world history may be on one shelf, whereas the cookbooks may be in an entirely different section of the library. In a cellular nucleus, there is over six feet of genetic material packed into a space 50 times smaller than the width of a human hair. How is the "library" in the nucleus organized?

When a cell needs to regulate certain genes, how does the cellular machinery find the right ones amongst 20,000 others?

A new paper from the laboratory of Mitchell Guttman, professor of biology, uses a powerful new tool that can peer into the world of the cell's genetic material (DNA and RNA) in order to find answers to these questions.

Led by former Guttman lab graduate student Sofia Quinodoz (PhD '20)—now a Hanna Gray postdoctoral fellow at Princeton University—the team found that molecules of non-coding RNA are responsible for establishing "compartments" within the nucleus and shepherding in key molecules to precise regions in the genome. Noncoding RNA are molecules that do not encode for proteins, and instead have an array of functions that are often still mysterious to biologists. In the library analogy, non-coding RNA molecules act as the "shelves" that organize different groups of genes and the machinery that interacts with them.

Understanding how genetic material is organized spatially is a crucial part of understanding the basic workings of life. Dysfunction within the nucleus is a hallmark of many diseases, including cancer, neurodegenerative disorders, and others.

The research was made possible by a powerful tool developed in the Guttman laboratory that enables detailed views of the RNA world, called RD-SPRITE (RNA and DNA Split-Pool Recognition of Interactions by Tag Extension). In essence, RD-SPRITE works by tagging molecules of RNA and DNA with miniscule unique barcodes based on their locations; analyzing the barcodes can then tell you which molecules were at which positions within the cell.

"This tool is something I've dreamed of since I was a grad student. It's remarkable that Sofia was able to make this happen," says Guttman. "It changes what we can look at in the RNA world. It's like developing a new microscope; you can start looking at things you could never see before. This discovery about RNA and organization is the tip of the iceberg in terms of what we are able to start finding in these data."

The team plans to use RD-SPRITE to compare the spatial organization of the nucleus between healthy cells and disease cell types, to understand how gene expression and the physical structure of the nucleus may be affected in disease states.

The paper is titled "RNA promotes the formation of spatial compartments in the nucleus." Sofia Quinodoz is the paper's first author along with co-second authors Caltech postdoctoral scholar Joanna Jachowicz, graduate student Prashant Bhat, and former postdoctoral scholar Noah Ollikainen. In addition to Guttman, other coauthors include former graduate student Abhik Banerjee, graduate student Isabel Goronzy, research scientist Mario Blanco, former postdoctoral scholar Peter Chovanec, senior research scientist Amy Chow, Yolanda Markaki of UCLA, former research technician assistant Jasmine Thai, and Kathrin Plath of UCLA. Funding was provided by the Howard Hughes Medical Institute, the National Science Foundation, the National Institutes of Health, the UCLA-Caltech Medical Scientist Training Program, the American

Cancer Society, the Division of Biology and Biological Engineering at Caltech, the National Heart Lung and Blood Institute, and the USC MD/PhD program.

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No matter when. No matter where…we are always there to serve you. Burma Shave.

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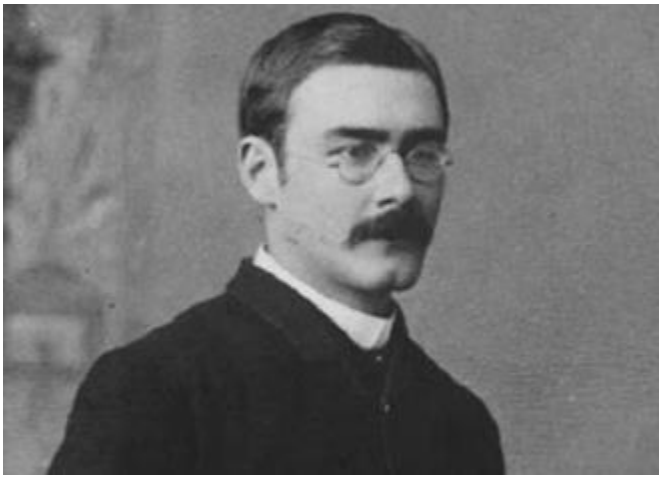
Rudyard Kipling (1865-1936)



Kipling's works of fiction include The Jungle Book (1894), Kim (1901), and many short stories, including "The Man Who Would Be King" (1888).[2] His poems include "Mandalay" (1890), "Gunga Din" (1890), "The Gods of the Copybook Headings" (1919), "The White Man's Burden: The United States and the Philippine Islands" (1899), and "If—" (1910). He is seen as an innovator in the art of the short story. His children's books are classics; one critic noted "a versatile and luminous narrative gift.

Henry James said "Kipling strikes me personally as the most complete man of genius, as distinct from fine intelligence, that I have ever known.

Literary critic Douglas Kerr wrote: "[Kipling] is still an author who can inspire passionate disagreement and his place in literary and cultural history is far from settled. But as the age of the European empires recedes, he is recognized as an incomparable, if controversial, interpreter of how empire was experienced. That, and an increasing recognition of his extraordinary narrative gifts, make him a force to be reckoned with."

Poems

Gunga Din

You may talk o' gin and beer
When you're quartered safe out 'ere,
An' you're sent to penny-fights an' Aldershot it;
But when it comes to slaughter
You will do your work on water,
An' you'll lick the bloomin' boots of 'im that's got it.
Now in Injia's sunny clime,
Where I used to spend my time
A-servin' of 'Er Majesty the Queen,
Of all them blackfaced crew
The finest man I knew
Was our regimental bhisti, Gunga Din,
He was 'Din! Din! Din!
'You limpin' lump o' brick-dust, Gunga Din!
'Hi! Slippy *hitherao*
'Water, get it! *Panee lao,*
'You squidgy-nosed old idol, Gunga Din.'

The uniform 'e wore
Was nothin' much before,
An' rather less than 'arf o' that be'ind,
For a piece o' twisty rag
An' a goatskin water-bag
Was all the field-equipment 'e could find.
When the sweatin' troop-train lay
In a sidin' through the day,

Where the 'eat would make your bloomin' eyebrows crawl,
We shouted 'Harry By!'
Till our throats were bricky-dry,
Then we wopped 'im 'cause 'e couldn't serve us all.
It was 'Din! Din! Din!
'You 'eathen, where the mischief 'ave you been?
'You put some *juldee* in it
'Or I'll *marrow* you this minute
'If you don't fill up my helmet, Gunga Din!'

'E would dot an' carry one
Till the longest day was done;
An' 'e didn't seem to know the use o' fear.
If we charged or broke or cut,
You could bet your bloomin' nut,
'E'd be waitin' fifty paces right flank rear.
With 'is mussick on 'is back,
'E would skip with our attack,
An' watch us till the bugles made 'Retire,'
An' for all 'is dirty 'ide
'E was white, clear white, inside
When 'e went to tend the wounded under fire!
It was 'Din! Din! Din!'
With the bullets kickin' dust-spots on the green.
When the cartridges ran out,
You could hear the front-ranks shout,
'Hi! ammunition-mules an' Gunga Din!'

I shan't forgit the night
When I dropped be'ind the fight
With a bullet where my belt-plate should 'a' been.
I was chokin' mad with thirst,
An' the man that spied me first
Was our good old grinnin', gruntin' Gunga Din.
'E lifted up my 'ead,
An' he plugged me where I bled,
An' 'e guv me 'arf-a-pint o' water green.
It was crawlin' and it stunk,
But of all the drinks I've drunk,
I'm gratefullest to one from Gunga Din.
It was 'Din! Din! Din!
''Ere's a beggar with a bullet through 'is spleen;
''E's chawin' up the ground,
'An' 'e's kickin' all around:

‘For Gawd’s sake git the water, Gunga Din!’

’E carried me away
To where a dooli lay,
An’ a bullet come an’ drilled the beggar clean.
’E put me safe inside,
An’ just before ’e died,
'I ’ope you liked your drink,’ sez Gunga Din.
So I’ll meet ’im later on
At the place where ’e is gone—
Where it’s always double drill and no canteen.
’E’ll be squattin’ on the coals
Givin’ drink to poor damned souls,
An’ I’ll get a swig in hell from Gunga Din!
Yes, Din! Din! Din!
You Lazarushian-leather Gunga Din!
Though I’ve belted you and flayed you,
By the livin’ Gawd that made you,
You’re a better man than I am, Gunga Din!

The Wrath of the Awakened Saxon

It was not part of their blood,
It came to them very late,
With long arrears to make good,
When the Saxon began to hate.

They were not easily moved,
They were icy — willing to wait
Till every count should be proved,
Ere the Saxon began to hate.

Their voices were even and low.
Their eyes were level and straight.
There was neither sign nor show
When the Saxon began to hate.

It was not preached to the crowd.
It was not taught by the state.
No man spoke it aloud
When the Saxon began to hate.

It was not suddenly bred.
It will not swiftly abate.
Through the chilled years ahead,
When Time shall count from the date
That the Saxon began to hate.

If—

If you can keep your head when all about you
Are losing theirs and blaming it on you,
If you can trust yourself when all men doubt you,
But make allowance for their doubting too;
If you can wait and not be tired by waiting,
Or being lied about, don't deal in lies,
Or being hated, don't give way to hating,
And yet don't look too good, nor talk too wise:

If you can dream—and not make dreams your master;
pIf you can think—and not make thoughts your aim;
If you can meet with Triumph and Disaster
And treat those two impostors just the same;
If you can bear to hear the truth you've spoken
\pTwisted by knaves to make a trap for fools,
Or watch the things you gave your life to, broken
And stoop and build 'em up with worn-out tools:

If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: 'Hold on!'

If you can talk with crowds and keep your virtue,
Or walk with Kings—nor lose the common touch,
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;
If you can fill the unforgiving minute
With sixty seconds' worth of distance run,
Yours is the Earth and everything that's in it,

And—which is more—you'll be a Man, my son!

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A 3D Ink Made Of Living Cells For Creating Living Structures

by Bob Yirka , Phys.org

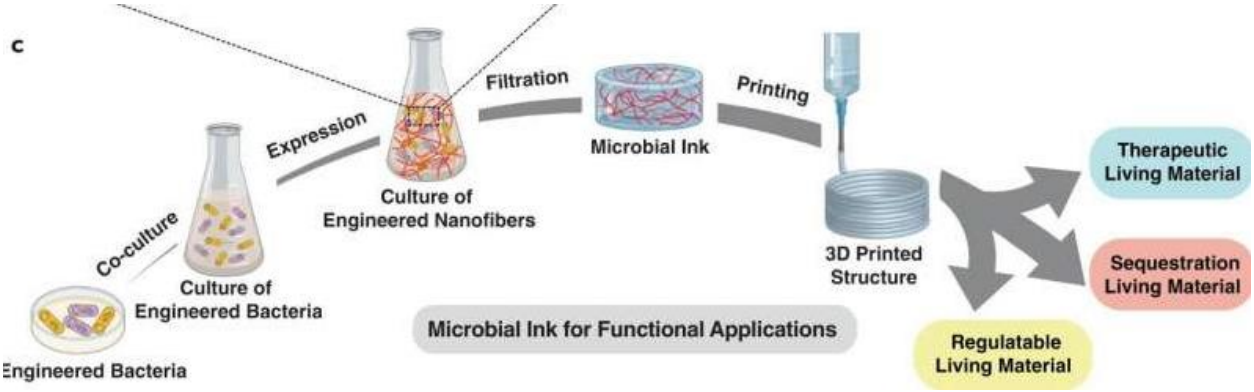

Fig. 1: Schematics of the design strategy, production, and functional applications of microbial ink. a E. coli was genetically engineered to produce microbial ink by fusing α (knob) and γ (hole) protein domains, derived from fibrin to the main structural component of curli nanofibers, CsgA. Upon secretion, the CsgA-α and CsgA-γ monomers self-assemble into nanofibers crosslinked by the knob-hole binding interaction. b The knob and hole domains are derived from fibrin, where they play a key role in supramolecular polymerization during blood clot formation. c The protocol to produce microbial ink from the engineered protein nanofibers involves standard bacterial culture, limited processing steps, and no addition of exogenous polymers. Microbial ink was 3D printed to obtain functional living materials.
Credit: DOI: 10.1038/s41467-021-26791-x

A team of researchers from Harvard University and Brigham and Women's Hospital, Harvard Medical School, has developed a type of living ink that can be used to print living materials. In their paper published in the journal Nature Communications, the group describes how they made their ink and possible uses for it.

For several years, microbial engineers have been working to develop a means to create living materials for use in a wide variety of applications such as medical devices. But getting such materials to conform to desired 3D structures has proven to be a daunting task. In this new effort, the researchers have taken a new approach to tackling the problem—engineering Escherichia coli to produce a product that can be used as the basis for an ink for use in a 3D printer.

The work began by bioengineering the bacteria to produce living nanofibers. The researchers then bundled the fibers and added other ingredients to produce a type of living ink that could be used in a conventional 3D printer. Once they found the concept viable, the team bioengineered other microbes to produce other types of living fibers or materials and added them to the ink. They then used the ink to print 3D objects that had living components. One was a material that secreted azurin—an anticancer drug—when stimulated by certain chemicals. Another was a material that sequestered Bisphenol A (a toxin that has found its way into the environment) without assistance from other chemicals or devices.

The researchers believe that their concept suggests that producing such inks could be a self-creating proposition. Engineering could be added to the microbes to push them to produce carbon copies of themselves—the ink could literally be grown in a jar. They also state that it appears possible that the technique could be used to print renewable building materials that would not only grow but could self heal—a possible approach to building self-sustaining homes here on Earth, or on the moon or on Mars.

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A Short Film about Music and the Human Spirit
…or Jazz at Mellifont Abbey

https://youtu.be/Tp6c_oG1SBk?t=3

This is a story about the resurrection of 93 year-old Edward Hardy through the magic of music.

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Rope Tricks from Hawaii

https://www.youtube.com/watch?v=nCBwEaB1eQU

Vivien Vajda. 14 time world champion! She's from Hungary and Brazil.

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Stone Art by Jon Foreman

https://www.thisiscolossal.com/2021/11/jon-foreman-land-works/?utm_campaign=PBS12week%20Newsletter&utm_medium=email&_hsmi=19198

5910&_hsenc=p2ANqtz-9hllUiOxVGX0Wz8NiMM8TjJ8MEUCE3DYft5byIXqbs6XE9-aMSfHXYi09KtYCgp9AVFVdarSPimMtozWUQY4J4NjBh-Q&utm_content=191985910&utm_source=hs_emai

Since Pembrokeshire, Wales has an extensive coastline, a huge part of Foreman's work revolves around the stones he finds near the sea. Using everything from tiny pebbles to big rocks, the artist surprises beachgoers with mesmerizing arrangements that never cease to amaze.

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In the Cold of Winter

In Drear-Nighted December
In drear-nighted December,
 Too happy, happy tree,
Thy branches ne'er remember
 Their green felicity:
The north cannot undo them
With a sleety whistle through them;
Nor frozen thawings glue them
 From budding at the prime.

In drear-nighted December,
 Too happy, happy brook,
Thy bubblings ne'er remember
 Apollo's summer look;
But with a sweet forgetting,
They stay their crystal fretting,
Never, never petting
 About the frozen time.

Ah! would 'twere so with many
 A gentle girl and boy!
But were there ever any
 Writhed not at passed joy?
The feel of not to feel it,
When there is none to heal it
Nor numbed sense to steel it,
 Was never said in rhyme.
—John Keats

Toast
Heap on more wood — the wind is chill
But let it whistle as it will,
We'll keep our merry Christmas still.

—Sir Walter Scott

Toast
Christmas is here,
Merry old Christmas,
Gift-bearing, heart-touching, joy-bringing Christmas,
Day of grand memories, king of the year.
—Washington Irving

Good King Sauerkraut
Good King Sauerkraut looked out
On his feets uneven…
Beware the snoo lay round an' bout…
All kerchoo achievin'…
—Walt Kelly

I Heard a Bird Sing
I heard a bird sing
In the dark of December
A magical thing
And sweet to remember.

'We are nearer to Spring
Than we were in September,'
I heard a bird sing
In the dark of December.
—Oliver Herford

From "I Am a Rock"
A winter's day
In a deep and dark December
I am alone
Gazing from my window
To the streets below
On a freshly fallen, silent shroud of snow
I am a rock
I am an island
—Paul Simon

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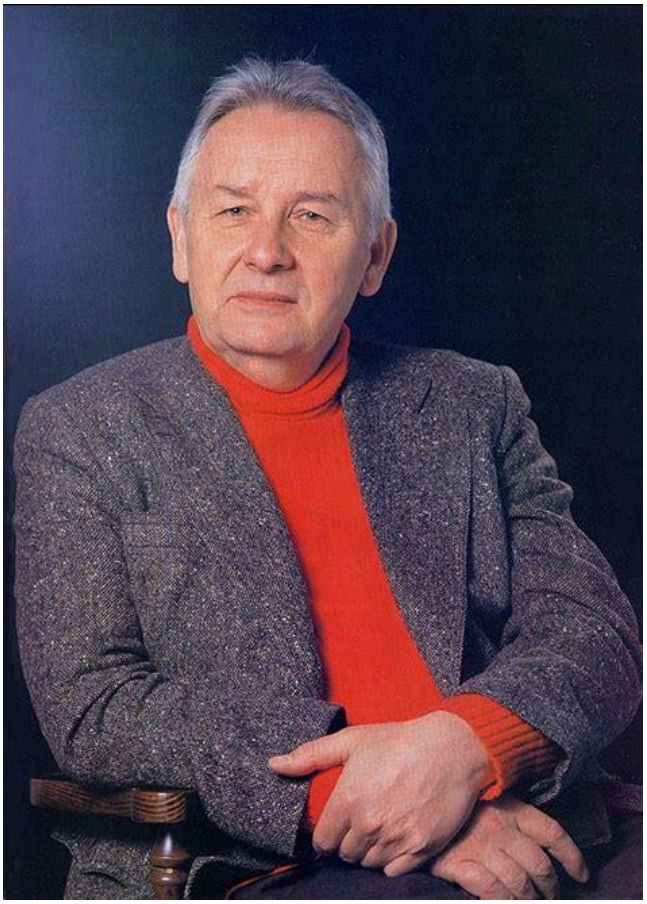
Bill Warner on Henryk Gorecki (1933-2010) and Minimalist Music

"I have to say I enjoy minimalist composers, too, Philip Glass included. (Not adverse to New Age, either.)

"I first heard Gorecki's 3rd (aka, The Symphony of Sorrowful songs) in 1993, when it had already been topping charts in Europe for several years. Since then I have listened to it once or twice each year, always without distractions and almost always with headphones. There are several versions out there. I like the Dawn Upshaw rendition best, probably because I like Upshaw anyway.



Górecki became a leading figure of the Polish avant-garde during the post-Stalin cultural thaw. His Webern-influenced serialist works of the 1950s and 1960s were characterized by adherence to dissonant modernism, but by the mid-1970s had changed to a less complex sacred minimalist sound, exemplified by the transitional Symphony No. 2 and the Symphony No. 3 (Symphony of Sorrowful Songs).

Symphony of Sorrowful Songs, released to commemorate the memory of those lost during the Holocaust, became a worldwide commercial and critical success, selling more than a million copies and vastly exceeding the typical lifetime sales of a recording of symphonic music by a 20th-century composer.

https://www.youtube.com/watch?v=87DJF1_vwQA&t=584s

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How This Guy Builds Amazing Lego Models

https://youtu.be/n7bch_3R6g0

PJ Catalano is a Master Model Builder at Legoland California Resort. He's been working at Legoland for 8 years and has built some truly incredible things. PJ talks about everything that goes into building Lego, from all the math he has to do to the various techniques he's learned that keep his models standing strong.

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My Walking Thoughts Sunday December 12 2021

Sticks & Stones Department

It's become standard procedure for strangers, friends, even compatriots in arms to obsess over the treatment accorded to Vietnam War returnees. Stories of verbal, lingual, and other such ugly abuses run rampant, some of which were no doubt true, but my experience was markedly different…as if it and my participation were miasma. Whether the vision was true or not, it allowed me to view the situation as someone else's problem, not mine.

It is postulated—I know of no reliable source so you can take it for what it is worth—that in contrast to the <2 million American servicemen and women who actually participated in the conflict, some 13 million citizens claim to have 'been there and done that'. While the number may be well inflated, I have met several—three to whom I can put name, face, and location with great certainty—who couldn't have been there and done what they claimed…including the stories of being spat on by sign-carrying, google-eyed hippies (ohmygod) upon their return. This makes me wonder how many other such tales can be similarly ascribed, serving perhaps as validation for the underlying fabrication.

If it were just the fabricators themselves carrying on this legend, that would be one thing, but for the pundits of the press and the increasing number of veterans' organizations to add to the melee is just plain sickening. Vietnam was different from anything we as a people had ever experienced, brought into the watering holes and living rooms around the nation 20 times a day. Everyone in the country knew far more about the war, its progress and implications than any of us there, so people in Enid, Sandusky, and Bull Creek were bound to feel as if they were legitimate participants, every much deserving of awards and decorations as those humping packs and weapons through kunai grass in southeast Asia.

It's different today where only people engaged in combat have a clue as to what's happening in Southwest Asia. The rest of the public was (and is) virtually ignorant of the purposes or issues regarding our activities in that neck of the woods until the decision was made to cut and run. Unlike Vietnam where the war sold advertising and got people elected, this time it didn't, so to the press and therefore to the nation as a whole, it has been a non-event.

Yet lots of people—ours and there's—died by the bushel. Our servicemembers who had been there before got to come home for a visit and then sent right back into the grinder…again and again and would you believe, again. When a long last their hitches were up, they came home to…to what? Silence? Ignorance? The guaranteed right to hold the same job they had six years before, subject to the whims of people who moved ahead in their jobs in the meantime.

Right now, we're hearing lots of shouting about the crisis in leadership that's landed us in today's cesspool, but the truth is that's only the tail end of a long and in my opinion tragic situation that the press had every reason to be there first and foremost to report to the public what was going on and then be ready to question the powers that were on just what they had in mind. Instead the entire situation has been allowed to proceed without oversight, until now it is too late.

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Root 66

Fried Chicken at The Prado

Yep, but we almost missed the feast at the Killen's home located on the street of that name. In true free-range mach-zero fashion, we wandered the city's northern precincts for nearly an hour before finally breaking down and asking a man walking his dog for directions.

Before you become too judgmental, please take into account that such mainstays as cell phones and GPS lay decades in the future, and while AAA did have street maps of Macon, first-off you had to know where the office was, and next it had to be somewhere between 8 a.m. and 4 pm…which more of the time it wasn't.

Anyway, while Tom and I stumbled from one unmarked street to the next, Aunt May, my mother's younger sister, tracked our progress by phone calls with neighbors who reported seeing (and hearing) this strange vehicle with California license plates wandering around aimlessly, so she figured we'd arrive there eventually. Rather than vexed she was pretty much amused, reckoning her fried chicken was time-tolerant of late-comers.

Finally on The Prado (without snow since it was June, not January), the first thing we spied was a picnic table on the lawn heaped with dishes and tureens; a promise of festivities to come. But it was the soft lights from little lanterns hung from the lower branches of trees with tops tipped in the amber glow of evening, that offered a special call of welcome. It's lived with me ever since.

Hall Killen, fifteen or so at the time, led the stampede to the driveway, his sister Campbell in hot pursuit. Behind them, moving more sedately came Aunt May and Uncle Wienie, waving happy welcomes. The evening was off to a spectacular start

Cousin Campbell, at eleven was the queen of the ball, arrayed in party dress that mirrored that of the Shirley Temple doll cradled in her arms. At first, she was a little anxious at the arrival of her California kin, but it wasn't long before she was sharing her doings and dreams with us.

Her older brother, Hall, needed no coaxing to show his sportscaster prowess, a talent easily matching the like of Chick Hearn or Vin Scully (you can tell the residence of this reporter). Not only did Hall sound the part, he had the wealth of information to match the big guys' gift of gab.

Aunt May was special without any effort. Willowy with a soft mezzo voice, she twinkled…I can think of no better description

While Wienie didn't twinkle, he was the perfect match for May, though I couldn't define just what that entailed. It was a family that worked. I'm sure he had another name,

maybe others as well, but that's what he went by and what everyone called him, though it seemed a bit off-the-mark for a man who stood a good six inches taller than I.

Dinner was in the very best way a riotous affair, Hall holding forth on subjects that on several occasions caused me to question the validity of his ideas. I, it turned out, was invariably wrong. Later, Tom expressed the fear that Hall might end up in politics, but he didn't, nor did he become a sportscaster.

Weenie shared his favorites of chilled Vidalia onions rings, pickled onion rings, sliced cheese and boiled/chilled potato slices dipped in Durkees dressing. The piece de resistance, however, was a chocolate cake that Campbell had baked with a picture of a Corvette in the icing.

Tom and I left with the feeling that if the evening and the family were presented on TV, no one in the audience would believe it. But we did.

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