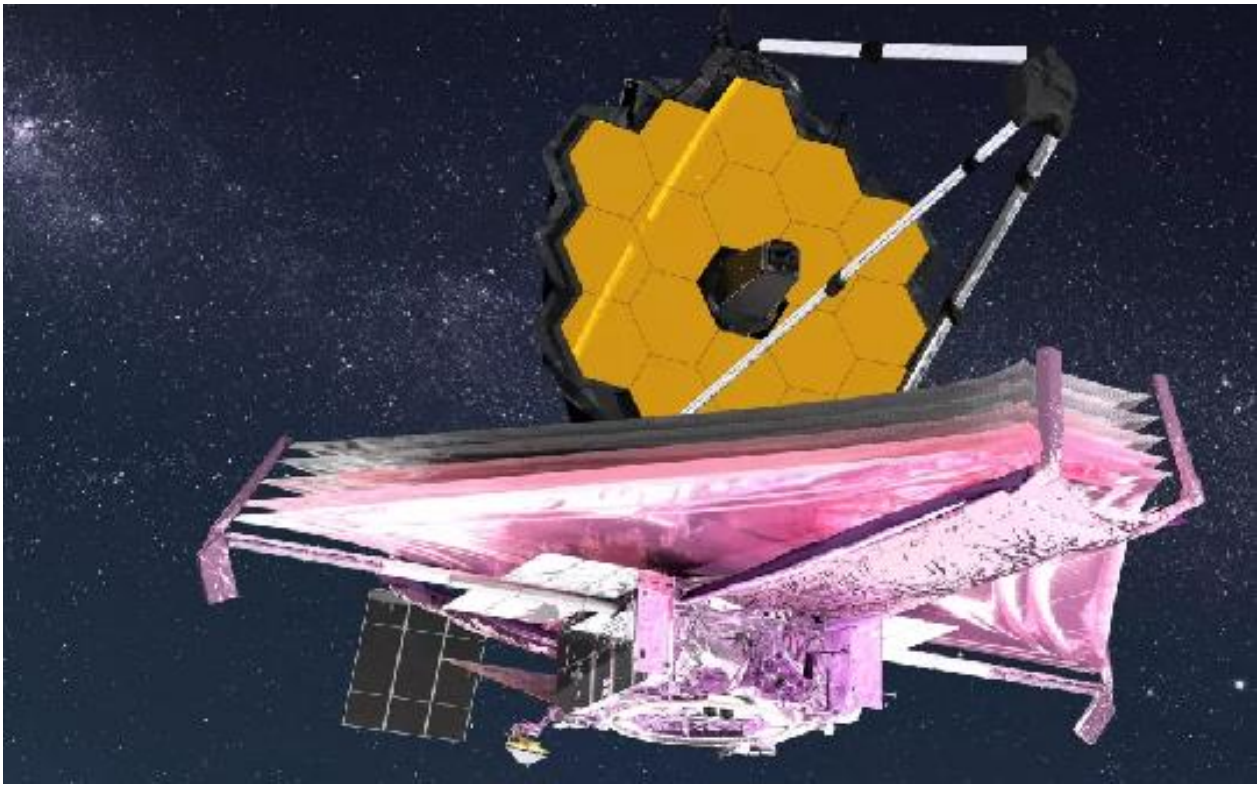
Ode to E Pluribus Unum for Sunday January 30 2022

James Webb Space Telescope Arrives at New Home in Space

By Chelsea Gohd



NASA's James Webb Space Telescope, seen here in an artist's illustration, has arrived at its new home in space: L2, the second Lagrange point.
(Image credit: NASA)

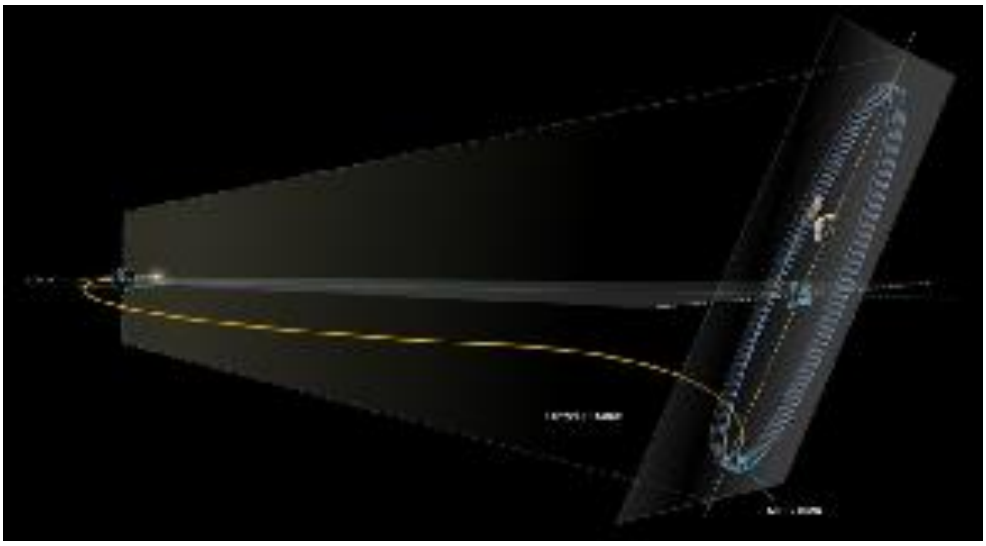
After traveling almost a million miles, NASA's James Webb Space Telescope reached its final destination on Jan. 24th.

The most powerful observatory ever to launch to space, the James Webb Space Telescope lifted off on Dec. 25, 2021 to explore the cosmos and our universe's earliest milestones. Since its successful takeoff, the $10 billion telescope has been busy deploying its various systems and structures and traveling over 930,000 miles (1.5 million kilometers) to its new home: L2, the second sun-Earth Lagrange point, which it will orbit. Lagrange points are gravitationally stable points in space.

30 days after launch (and after a one-day delay), Webb arrived at L2.

"Webb, welcome home!" NASA Administrator Bill Nelson said in an agency blog post. "Congratulations to the team for all of their hard work ensuring Webb's safe arrival at L2 today. We're one step closer to uncovering the mysteries of the universe. And I can't wait to see Webb's first new views of the universe this summer!"

The James Webb Space Telescope has begun its MCC2 maneuver, an insertion burn into orbit around L2 on Jan. 24, 2022.



The James Webb Space Telescope began its MCC2 maneuver, an insertion burn into orbit around L2 on Jan. 24, 2022.
(Image credit: NASA)

Webb has spent the past 30 days slowly and carefully unfolding its sunshield and other vital parts. On Jan. 19, for example, the telescope finished deploying the 18 hexagonal segments that make up its glorious gold primary mirror.

The overall deployment process has been anxiety-inducing, for it includes hundreds of potential single-point failures that could each spell disaster for Webb. But despite any nerves, Webb has made it through deployment spectacularly, and its arrival in orbit around L2 is another huge milestone to check off.

Once it arrived near L2, Webb began what's called a mid-course correction burn (MCC2), which is an insertion burn, a maneuver that saw scope fire its small thrusters

to get into orbit around L2. The burn took about five minutes (297 seconds) and began at about 2 p.m. EST (1900 GMT) January 24th, according to the blog post.

This maneuver was built into the mission plan for safety's sake. The Ariane 5 rocket that launched Webb to space didn't send it all the way to L2, because the mission team wanted to make sure the observatory didn't overshoot its final destination. That situation would require turning Webb around to thrust back toward Earth, which would expose its instruments to the sun, overheating them, according to NASA. Webb and its instruments need to stay extremely cold in order to work as designed and pick up on the ultra-faint heat signatures from the early universe.

So, they launched Webb with not quite enough thrust to get all the way to its final stop, allowing it to complete the final leg of the journey with its own small thrusters and the small amount of propellant that's onboard.

Once orbiting L2, Webb will begin cooling down and turning on its four scientific instruments. It will take weeks still for this cooling to be completed and for Webb to reach a stable temperature. Following this cooldown, Webb will spend about five months perfectly aligning and calibrating its optics and scientific instruments.

Webb will spend its lifetime at L2. It was previously thought that the observatory might operate for just 5 to 10 years in space because of its limited propellant supply and the fact that it was not intended to be refueled. However, after launch, the mission team now expects that Webb will have "significantly more than a 10-year science lifetime," thanks to the job the Ariane 5 did on launch day, NASA officials wrote in a post-launch statement.

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Caltech Names Laurie Leshin Director of JPL

Laurie Leshin formally assumes her roles as director of NASA JPL and vice president of Caltech in May.
credit: photo courtesy worcester polytechnic institute

The distinguished geochemist and space scientist brings more than 20 years of leadership experience in academic and government service to JPL.

Laurie Leshin, president of Worcester Polytechnic Institute (WPI), has been appointed director of the Jet Propulsion Laboratory (JPL) and vice president of Caltech. Leshin will formally assume her position on May 16, 2022, succeeding Michael Watkins, who retired in August 2021, and Lt. Gen. Larry D. James USAF (Ret.), who currently serves as JPL interim director.

She joins JPL from WPI, one of the nation's oldest private STEM universities, where she has served as president since 2014. She is the first woman president in the university's 150-year history and will be JPL's first female director.

"Laurie Leshin stood out in an exhaustive international search because of her profound commitment to people, her strategic approach to scientific and technological opportunities, her deep appreciation of NASA's leadership in space exploration and Earth science, her mastery of complex organizations, and her ability to inspire the next generation of scientists and engineers," says Caltech president Thomas F. Rosenbaum, the Sonja and William Davidow Presidential Chair and professor of physics. "We are so pleased to be able to welcome Laurie back to campus and to JPL."

"NASA's Jet Propulsion Laboratory has a storied history of defying what was once thought impossible in the field of space exploration. In this new era of groundbreaking discoveries and constant innovation, it is clear that Dr. Laurie Leshin has a track record

of scholarship and leadership needed to serve as director of JPL and cement the center's status as a global leader in the 21st century," says NASA Administrator Bill Nelson. "Under Dr. Leshin, the technology invented at JPL will continue to allow humans to explore the places in our universe that we cannot yet reach and spark the imaginations of future mathematicians, engineers, and pioneers in classrooms across America. I want thank Mike Watkins and Gen. Larry James for their contributions that the JPL team will build on for decades to come."

Leshin is an internationally recognized scientist whose career has spanned academia and senior positions at NASA, and included two White House appointments. She has been lauded for her barrier-breaking leadership in the space industry and in academia as well as for her accomplishments as a distinguished geochemist and space scientist.

"I am both thrilled and humbled to be appointed the director of JPL. In many ways, this feels like a homecoming. Some of the most impactful experiences of my career have taken place on the Caltech campus and at JPL – lessons learned and goals achieved that have shaped me as a leader and a space scientist. The opportunity to return to working closely with so many colleagues across Caltech – at the Lab and on campus – and at NASA is a dream come true," Leshin says. "We have enormous opportunities ahead to leverage JPL's global leadership in robotic space exploration to answer awe-inspiring scientific questions and improve life here on Earth. I look forward to my work with Caltech and NASA to ensure that JPL continues to drive innovation across the global space ecosystem. Finally, I am especially honored to be the first woman to hold the title of director of JPL. I know from personal experience that diverse teams make greater impact, and I will work every day to ensure that JPL is a place where all belong and thrive. We will dare mighty things, together."

In 2005, she became director of science and exploration at NASA's Goddard Space Flight Center, and in 2008, she was promoted to Goddard's deputy director for science and technology, where she and colleagues were responsible for the strategy, planning, and implementation of more than 50 Earth and space flight projects. In 2010, Leshin assumed the role of deputy associate administrator of the Exploration Systems Mission Directorate at NASA Headquarters, where her work involved the oversight of the future human spaceflight program, including efforts to establish commercial crew capabilities and elements of what is now the Artemis program. In that role, Leshin also worked to catalyze worldwide space exploration by engaging with international space organizations and corporations, and through developing new technologies and robotic missions to create new possibilities for humans to travel to destinations deeper in the solar system. Leshin left NASA in 2011 to join Rensselaer Polytechnic Institute as dean of the School of Science.

At WPI, Leshin focused on expanding research, WPI's signature Global Projects Program, and ways to address gender disparity in STEM. In addition, during her presidential tenure, new academic and collaboration spaces were developed on the WPI campus, notably a 40,000-square-foot Innovation Studio, with flexible, creative space for active learning classrooms, and the newly opened Unity Hall, a 100,000-square-foot academic building focused on robotics engineering, data science, cybersecurity, learning

sciences and technology, and other emerging interdisciplinary programs. WPI is now among STEM institutions with the highest percentage of female undergraduate students and is recognized for its balance of excellence in teaching and groundbreaking research.

Alongside her administrative career, Leshin has continued her scientific endeavors, which are focused on deciphering the record of water on objects in our solar system. For example, she served as a member of the Mars Science Laboratory science team that analyzed data collected by the Curiosity rover to find evidence of water on the surface of Mars. She has also been involved in planning and advocating for Mars Sample Return missions for more than two decades.

Raised in Arizona, Leshin earned a bachelor's degree in chemistry from Arizona State University (ASU), followed by master's and doctoral degrees in geochemistry from Caltech. After a postdoctoral fellowship at UCLA, she served as a professor of geological sciences at ASU and director of its Center for Meteorite Studies. Before leaving ASU for NASA, she led the formation of ASU's pathbreaking School of Earth and Space Exploration.

Leshin is a recipient of NASA's Outstanding Leadership Medal and Distinguished Public Service Medal, and of the Meteoritical Society's Nier Prize, awarded for outstanding research in meteoritics or planetary science by a scientist under the age of 35. The International Astronomical Union recognized her contributions to planetary science with the naming of asteroid 4922 Leshin.

In 2004, Leshin served on President George W. Bush's Commission on Implementation of United States Space Exploration Policy, a nine-member commission charged with advising the president on the execution of his new Vision for Space Exploration. In 2013, President Barack Obama appointed Leshin to the advisory board of the Smithsonian Institution's National Air and Space Museum. Since 2016, she has co-chaired the National Academies Government-University-Industry Research Roundtable.

In 2021, Leshin received Caltech's Distinguished Alumni Award, which is bestowed annually by the Institute in recognition of personal and professional accomplishments that have made a noteworthy impact in a field, community, or society more broadly.

A committee composed of Caltech trustees, faculty, senior administrative leaders, and two members of the JPL community conducted an extensive search and recommended Leshin to Caltech's president. JPL, which was founded by Caltech faculty and students in 1936, has been managed by Caltech on behalf of NASA since 1958.

Interim director Lt. Gen. James will resume his position as deputy director when Leshin formally assumes her position.

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22-Year-Old Builds Chips in His Parents' Garage

Sam Zeloof combines 1970s-era machines with homemade designs. His creations show what's possible for small-scale silicon tinkerers.

Zeloof fixes up obsolete equipment bought online, including an electron microscope, to make his chips.
photograph: sam kang

https://www.wired.com/story/22-year-old-builds-chips-parents-garage/?bxid=617fdd8c62717d23af47aa50&cndid=67131721&esrc=WIR_etrans&source=EDT_WIR_NEWSLETTER_0_GADGET_LAB_ZZ&utm_brand=wired&utm_campaign=aud-dev&utm_content=WIR_GadgetLab%202022-01-27&utm_mailing=WIR_GadgetLab%202022-01-27&utm_medium=email&utm_source=nl&utm_term=WIR_GadgetLab

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The Fujita San Raid

Nobuo Fujita, a Japanese pilot, was the only person to ever bomb the contiguous US. After the war, he was invited back to the same town he bombed (Brookings, Oregon).

Once there, Fujita offered his family's katana to the mayor, as a token of remorse and humility.

Hours before sunrise off the coast of Oregon in September of 1942, there was movement on a submarine. It was nine months after the attack on Pearl Harbor and a team of Japanese sailors were quickly assembling a seaplane on the deck.

Next to them was a catapult for takeoff and a crane to pick the wheel-less plane from the sea after the mission - they were going to bomb the coast as retaliation for what was known as the 'Doolittle raids' which had struck Tokyo months prior.

30 year-old fighter pilot Nobuo Fujita had wanted to bomb LA or San Francisco - but had been told by his superiors to target Brookings, Oregon.

Fujita would ignite the forest, engulfing a chain of towns, drawing valuable resources away from battle and inciting fear throughout the West Coast.

But Oregon conditions wouldn't allow it. It was wet and the bombs fizzled in the damp woods.

The crew packed away the plane and headed back West.

20 years later, a group of Brookings businessmen invited Fujita back for the towns' Memorial Day celebrations.

When Fujita arrived, he gifted his families prized 400-year-old samurai sword to the town.

Brookings and Fujita forged a bond that lasted the next 3 decades. The town made him an honorary citizen in 1997. He passed away just days later at 85 years old.

A tree had been planted in the place where Fujita dropped the bombs, his daughter spread his ashes at the location. She said she felt his soul would be flying over the forest forever.

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17 syllables of temporary salvation

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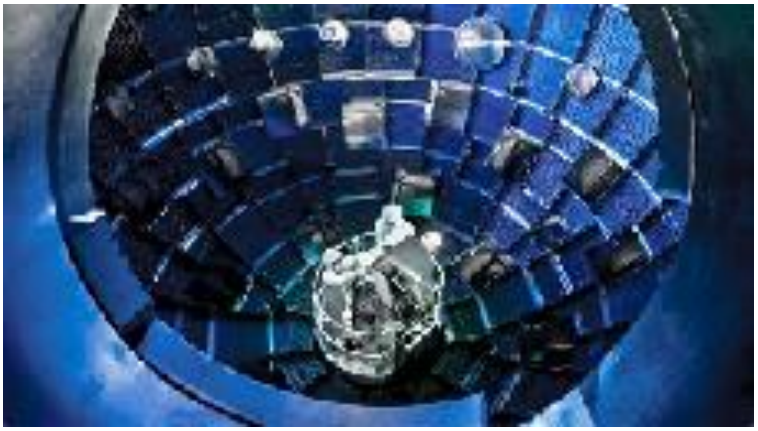
Fusion Milestone



Researchers detailed yesterday the generation of a so-called burning plasma, a key milestone toward self-sustaining fusion power. The paper covers the results of a series of experiments carried out over the past two years.

Unlike traditional nuclear power, which relies on fission—energy released when a heavy atom splits into lighter atoms—fusion power harnesses energy released when lighter atoms combine.

https://youtu.be/j_snOFH2K7A

A burning plasma is one where fused atoms provide the majority of heat, a critical step toward the ultimate goal of creating a fusion reaction with enough power to sustain itself. Fusion reactions create millions of times more energy than sources like coal and natural gas, and many researchers consider the commercialization of fusion plants a holy grail of power generation.

The experiments took place at the National Ignition Facility at Livermore Lab in Livermore, California, a facility that focuses nearly 200 lasers onto a single fuel pellet.

https://youtu.be/2W-GEE6YU4M

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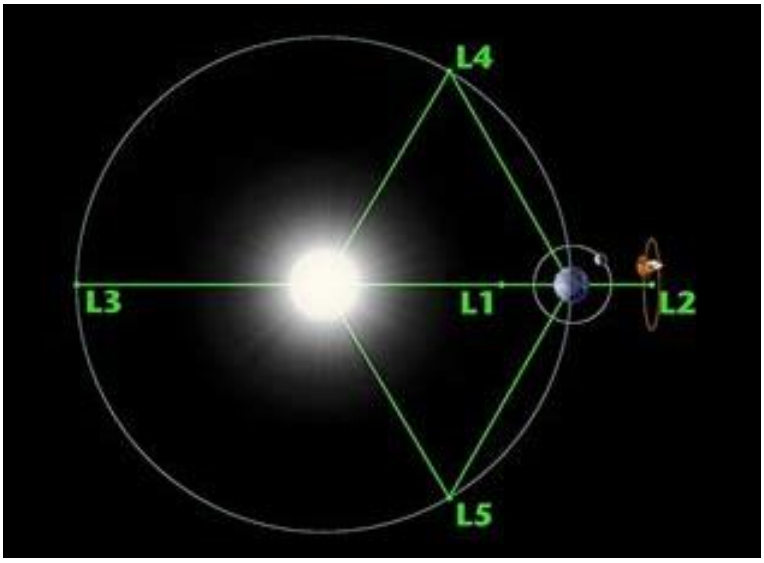
Lagrange Points Animation



The five Lagrange Points
chicagospace.org

https://youtu.be/z52WWLE8bBo

Animation showing the Earth/Moon system and it's Lagrange points. It's not precise but it shows how these points revolve around Earth while staying fixed relative to The Moon and this was the overall goal here. Specifically, it clearly shows how the L2 point can never be seen from Earth even though it's constantly orbiting our planet - a source of confusion for many. From our perspective here on Earth the L2 point will always be behind The Moon and I hope this small animation illustrates that in a way that can be understood.

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Arcangelo Corelli 12 Concerti Grosso

Musicians at the court of Crown Prince Ferdinando de' Medici by Antonio Domenico Gabbiani 1685. Oil on canvas, 140 x 233cm. Inv.no. 2805 Museo di Strumenti Musicali

https://youtu.be/3b9hYyEL6sU

Italian violinist and composer, Arcangelo Corelli, (1653-1713), is known chiefly for his influence on the development of violin style and for his sonatas and his 12 Concerti Grossi, which established the concerto grosso as a popular medium of composition.

Corelli did not live to see the publication of his Opus 6, consisting of 12 concerti grossi, which was published in Amsterdam the year following his death.

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Americans tend to assume imaginary faces are male

Why people perceive faces in inanimate objects as male by default is still unclear

People often see imaginary faces in everyday objects, such as this smiling face in a cheese grater. These faces were more often seen as male than female by U.S. adults in a new survey.
paul david galvin/moment/getty images plus

By Maria Temming

There may be a reason we see a man, rather than a maiden, in the moon. When people spot facelike patterns in inanimate objects, those faces are more likely to be perceived as male than female, researchers report in the Feb. 1 Proceedings of the National Academy of Sciences.

In experiments with over 3,800 U.S. adults recruited online, participants reviewed about 250 photos of illusory faces — in objects from potatoes to suitcases — and labeled each one as male, female or neutral. Faces were deemed male about four times as often as they were female. Both male and female participants showed that bias, with about 80 percent of participants labeling more images male than female. Only 3 percent judged more to be female than male. The remaining 17 percent of respondents were fairly evenhanded in their labels.

In follow-up experiments, participants did not show the same bias toward images of the same kinds of objects without illusory faces. That finding helped rule out the possibility that participants viewed something about the underlying objects as masculine or feminine. Computer models that scoured the illusory face photos for stereotypically masculine or feminine elements — such as more angular or curved features (SN: 6/29/01) — couldn't explain the bias, either.

The new study suggests that Americans tend to see the basic pattern of a face, like the one on this basketball hoop, as male by default. This gender bias seems to arise early in life, appearing in children as young as about 5, more recent research by the same scientists found.

"There's this asymmetry in our perception," says study author Susan Wardle, a cognitive neuroscientist at the National Institutes of Health in Bethesda, Md. Given the most basic pattern of a face, as is seen in illusory faces, "we're more likely to see it as male, and it requires additional features to see it as female," Wardle says. She points to the fact that female emojis and Lego characters are often distinguished from their male counterparts by the addition of bigger lips, longer lashes or other feminizing features.

It's not yet clear why people perceive the basic structure of a face as male by default, Wardle says. But in a more recent study, she and her colleagues found the same gender bias in grade school kids as young as about 5 — suggesting it arises early in life.

"I was not surprised that people would assign gender to illusory faces," says Sheng He, a cognitive neuroscientist at the Chinese Academy of Sciences in Beijing who was not involved in the research. He was, however, surprised by the strength of the gender bias that Wardle's team discovered and wonders whether people living in matriarchal societies would show the same — or perhaps the opposite — bias in their reading of faces.

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Doggy Love

https://mail.google.com/mail/u/0?ui=2&ik=4ed36993f3&attid=0.2&permmsgid=msg-f:1722636273333788135&th=17e808904d435de7&view=att&disp=inline

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Flying Fish & Aquarium Pets Yield Secrets of Evolution

Flying fish can glide over the surface of the ocean because of adaptations in their body proportions. Surprisingly few genetic changes were needed for these adaptations.

https://www.quantamagazine.org/flying-fish-and-aquarium-pets-yield-secrets-of-evolution-20220105/

To escape predators beneath the waves, a flying fish can shoot out of the water and glide long distances because its paired pectoral and pelvic fins, longer and more rigid than those of other fish, act as airfoils. In a quirky triumph of evolution, creatures that were once strictly aquatic transformed into temporarily airborne ones through a few modifications in body shape.

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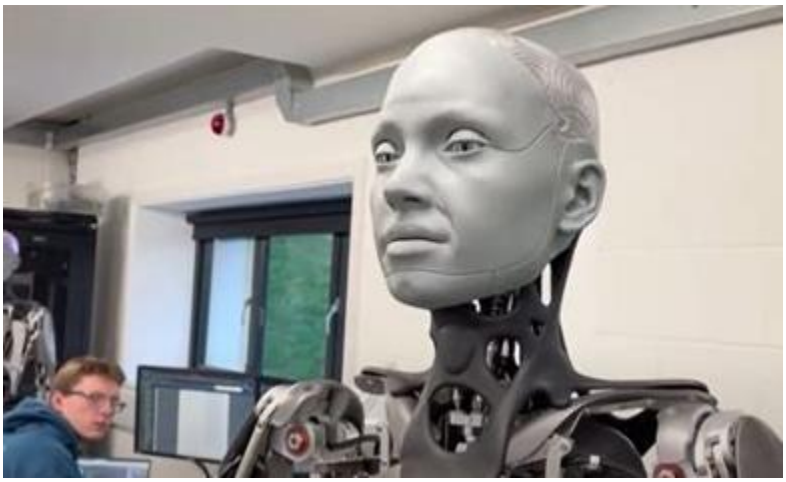
Humanoids are Here. Meet Ameca



https://youtu.be/LzBUm31Vn3k

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Things that are Good for the Soul

A married Irishman went into the confessional and said to his priest, 'I almost had an affair with another woman.'

The priest said, 'What do you mean, almost?'

The Irishman said, 'Well, we got undressed and rubbed together, but then I stopped.'

The priest said, 'Rubbing together is the same as putting it in. You're not to see that woman again. For your penance, say five Hail Marys and put $50 in the poor box.'

The Irishman left the confessional, said his prayers, and then walked over to the poor box.

He paused for a moment and then started to leave.

The priest, who was watching, quickly ran over to him saying, 'I saw that. You didn't put any money in the poor box!'

The Irishman replied, 'Yeah, but I rubbed the $50 on the box, and according to you, that's the same as putting it in!'

Lemon Squeeze

There once was a religious young woman who went to Confession. Upon entering the confessional, she said, 'Forgive me, Father, for I have sinned.'

The priest said, 'Confess your sins and be forgiven.'

The young woman said, 'Last night my boyfriend made mad passionate love to me seven times.'

The priest thought long and hard and then said, 'Squeeze seven lemons into a glass and then drink the juice.'

The young woman asked, 'Will this cleanse me of my sins?'

The priest said, 'No, but it will wipe that smile off of your face.'

Catholic Dog

Muldoon lived alone in the Irish countryside with only a pet dog for company. One day the dog died, and Muldoon went to the parish priest and asked, 'Father, my dog is dead. Could ya' be saying a mass for the poor creature?'

Father Patrick replied, 'I'm afraid not. We cannot have services for an animal in the church. But there are some Baptists down the lane, and there's no tellin' what they believe. Maybe they'll do something for the creature.'

Muldoon said, 'I'll go right away Father. Do ya' think $5,000 is enough to donate to them for the service?'

Father Patrick exclaimed, 'Sweet Mary, Mother of Jesus! Why didn't ya tell me the dog was Catholic?

Donation

Father O'Malley answers the phone. 'Hello, is this Father O'Malley?'

'It is!'

'This is the Taxation Department. Can you help us?'

'I'll try!'

'Do you know a Ted Houlihan?'

'I do!'

'Is he a member of your congregation?'

'He is!'

Did he donate $10,000 to the church?'

'He will!'

Confession

An elderly man walks into a confessional. The following conversation ensues:

Man: 'I am 92 years old, have a wonderful wife of 70 years, many children, grandchildren and great grandchildren. Yesterday, I picked up two hitch-hiking college girls. We went to a motel where I had sex with each of them three times.'

Priest: 'Are you sorry for your sins?'

Man: 'What sins?'

Priest: 'What kind of a Catholic are you?'

Man: 'I'm Jewish.'

Priest: 'Why are you telling me all this?'

Man: 'I'm 92 years old . . . I'm telling everybody!'

Brothel Trip

An elderly man goes into a brothel and tells the madam he would like a young girl for the night. Surprised, she looks at the ancient man and asks how old he is.

'I'm 90 years old,' he says.

'90?' replies the woman. 'Don't you realize that you've had it?'

Oh, sorry,' says the old man. 'How much do I owe you?'

Senility

An elderly man went to his doctor and said, 'Doc, I think I'm getting senile. Several times lately, I have forgotten to zip up.'

'That's not senility,' replied the doctor. 'Senility is when you forget to zip down.'

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Ready for the Winter Olympics? They Start on Friday.

Bolero https://youtu.be/nC50M6LHcHY?t=4

Let's Face the Music https://youtu.be/U89Id2JIL1w

Jane Torvill and Christopher Dean took what was once the least interesting of the ice skating events and turned it into the toughest, most precise exhibitions of all.

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How Many Years Do You Have Left?

How long will you live? This is a calculator that estimates your life expectancy.

http://media.nmfn.com/tnetwork/lifespan

Watch your age in the upper right corner!

Kinda' fun to watch your age go up and down as you answer the questions. Now this is interesting, give it a try....

It was developed by Northwestern Mutual Life. It's interesting that there are only 13 questions. Yet, they can predict how long you're likely to live.

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Epidemiologists Develop Tool for Measuring the Pace of Aging

DunedinPACE reveals wide range of population aging rates and can predict future disease and mortality

Researchers at Columbia University Mailman School of Public Health have developed a new blood test to measure the pace of biological aging. Based on an analysis of chemical tags on the DNA contained in white blood cells, called DNA methylation marks, the new test is named DunedinPACE, after the Dunedin Birth Cohort used to develop it. DunedinPACE (stands for Pace of Aging Computed from the Epigenome) is a new addition to a fast-growing list of DNA methylation tests designed to measure aging and contributes value-added over and above the current state of the art. The findings are published online in the journal e-Life.

"What makes DunedinPACE unique is that, whereas other tests aim to measure how old or young a person is, DunedinPACE measures whether you are aging quickly or slowly," said Daniel Belsky, PhD, assistant professor of epidemiology at Columbia Mailman School and a researcher at the Columbia Aging Center. This design could make DunedinPACE more a more sensitive tool to detect effects of interventions that aim to slow aging or of exposures that accelerate aging processes.

Daniel Belsky
Duke University Dept, of population health sciences

"Whereas other measures of aging are designed to capture all aging-related change accumulated across the life course, our measure is focused on changes occurring over the recent past," explained Belsky. "What is striking is that, even with this more restricted focus, DunedinPACE is equally precise as the best of the currently available tests in predicting disease, disability, and mortality in the future, and it adds value to risk assessments over and above these measures."

Developed by Belsky and colleagues at Duke University and the University of Otago, DunedinPACE tracks changes in 19 biomarkers of organ-system integrity in the 1000-member Dunedin Study birth cohort, who were first enrolled in the study at birth in 1972-1973 and have been followed up ever since, most recently at the time of their 45th birthday. This study used data collected from the participants when they were all aged 26, 32, 38, and 45 years.

The use of a single-year birth cohort to develop the measure ensures DunedinPACE is not contaminated by biases that may affect studies that compare older to younger people, including survival bias, historical differences in exposure. The analysis of changes that occurred within Study members' bodies as they aged over the 20-year

follow-up also ensures that DunedinPACE measures aging-related changes occurring during adult life.

In addition to the Dunedin Study, the researchers also used data from the Understanding Society Study, the Normative Aging Study, the Framingham Heart Study, and the Environmental Risk (E- Risk) Longitudinal Twin Study.

In the current analysis, midlife and older adults with faster DunedinPACE were at increased risk for incident chronic disease, disability, and mortality; across the lifespan, DunedinPACE was correlated with measures of biological age derived from blood chemistry and DNA methylation data, and with research participants' subjective perceptions of their own health. It also indicated faster Pace of Aging in young adults with histories of exposure to poverty and victimization.

"In sum, DunedinPACE represents a novel measure of aging that can complement existing DNA methylation measures of aging to help advance the frontiers of geroscience," noted Belsky, who is also with the Robert N. Butler Columbia Aging Center, Columbia Mailman School.

The current analysis establishes DunedinPACE as a novel single-time-point measure that quantifies Pace of Aging with whole blood samples, that can be readily implemented in most DNA methylation datasets, making it immediately available for testing in a wide range of existing datasets as a complement to existing methylation measures of aging.

"There is growing interest in technologies to measure a biological age, defined as how much older or younger a person is biologically than their birthdate would predict. Our study reveals that it is also possible to measure Pace of Aging, or how fast a person's body is declining. Together, these measurements can help us understand the factors that drive accelerated aging in at-risk populations and identify interventions that can slow aging to build aging health equity."

Co-authors are Avshalom Caspi, Terrie Moffitt, King's College, UK and Duke University; David Corcoran, Karen Sugden, Kartik Chamarti, Hona Lee Harrington, Renate Houts, Benjamin Williams, Duke University; Richie Poulton, University of Otago, NZ; Louise Arseneault, King's College, UK; Andrea Baccarelli, Columbia University Mailman School of Public Health; Xu Gao, Peking University; Eilis Hannon, Jonathan Mill, University of Exeter, UK; Meeraj Kothari and Dayoon Kwon, Robert N. Butler Columbia Aging Center, Columbia Mailman School of Public Health; Joel Schwartz and Cuicui Wang, Harvard TH Chan School of Public Health; and Pantel Vokonas, Veterans Affairs Boston Healthcare System, Boston University School of Medicine.

The research was supported by National Institute on Aging (grants AG032282, AG061378, AG066887); and Medical Research Council (grant P005918).

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Robot Umpires at Home Plate Moving Up to Triple-A For 2022

NEW YORK -- Robot umpires have been given a promotion and will be just one step from the major leagues this season. Major League Baseball is expanding its automated strike zone experiment to Triple-A, the highest level of the minor leagues.

MLB's website posted a hiring notice seeking seasonal employees to operate the Automated Ball-Strike system. MLB said it is recruiting employees to operate the system for the Albuquerque Isotopes, Charlotte Knights, El Paso Chihuahuas, Las Vegas Aviators, Oklahoma City Dodgers, Reno Aces, Round Rock Express, Sacramento River Cats, Salt Lake Bees, Sugar Land Skeeters and Tacoma Rainiers.

The independent Atlantic League became the first American professional league to let a computer call balls and strikes at its All-Star Game in July 2019 and experimented with ABS during the second half of that season. The system also was used in the Arizona Fall League for top prospects in 2019, drawing complaints of its calls on breaking balls.

There were no minor leagues in 2020 because of the pandemic, and robot umps were used last season in eight of nine ballparks at the Low-A Southeast League.

The Major League Baseball Umpires Association agreed in its labor contract that started in 2020 to cooperate and assist if commissioner Rob Manfred decides to use the system at the major league level.

"It's hard to handicap if, when or how it might be employed at the major league level, because it is a pretty substantial difference from the way the game is called today," Chris Marinak, MLB's chief operations and strategy officer, said last March.

MLB said the robot umpires will be used at some spring training ballparks in Florida, will remain at Low A Southeast and could be used at non-MLB venues.

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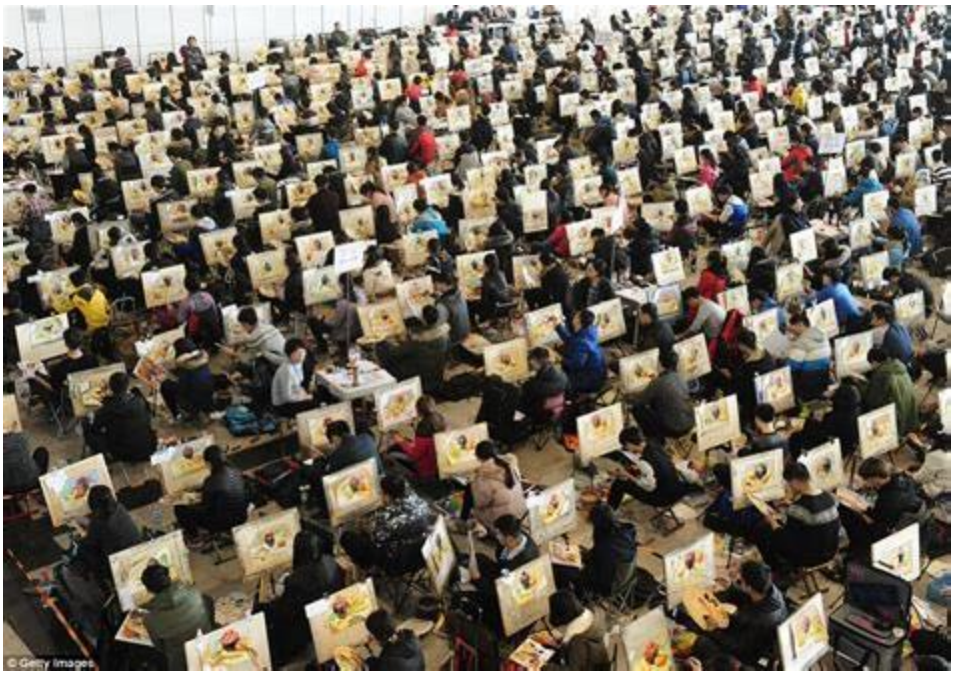
SAT Goes Digital



The College Board announced this week the SAT college admission exam will switch to an all-digital and shorter format in the US beginning spring 2024 and internationally in 2023. Among other changes, the exam will be shortened to two hours, and calculators will be allowed for all math sections.

The news comes as more than 1,800 colleges have dropped the SAT requirement or made it optional for fall 2022 admission, as critics said the exams provide an unfair advantage to affluent students. The change accelerated during the pandemic and resulted in significant loss of revenue for the board (WSJ, paywall)—decreasing from $1.05B in 2019 to $760M in 2020.

Despite the online format, the test will take place at a proctored test center, albeit on students' personal or school-issued devices. The board said in a trial run, over 80% of students found the online option less stressful.

I wonder how long it will be before the SAT become about as difficult as the draft physical intelligence test I took in 1958 that featured such cliffhangers as matching a picture of a hammer with one showing its intended companion; an apple, a nail, or a head. Think how much better it would have been in electronic format.

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How mRNA Could Help Fight Cancer

In a CAS lab, biologist Ana Fiszbein is exploring mRNA's potential to treat—and prevent—a disease that strikes 1.8 million Americans every year, and kills more than 600,000: cancer.
Photo by Cydney Scott

By Andrew Thurston for Boston University Arts & Sciences

Among the many acronyms and initialisms that the coronavirus has thrown into our lives—COVID-19, PPE—one of the most promising is mRNA. It's shorthand for messenger ribonucleic acid, a molecule found in our cells that transmits the essential genetic instructions to build, maintain, and repair our bodies. For more than a year, a lab-made mRNA that helps teach our bodies how to take down COVID has been powering the vaccines that are saving lives.

With billions of shots successfully given worldwide, researchers are delving into other potential uses for the technology, such as vaccines for zika and malaria, as well as therapies for sickle cell anemia and cystic fibrosis. In a CAS lab, biologist Ana Fiszbein is exploring mRNA's potential to treat—and prevent—a disease that strikes 1.8 million Americans every year, and kills more than 600,000: cancer.

"In my family, there's a lot of cancer history," says Fiszbein, an assistant professor who joined CAS in January 2021. "If I can do anything to help cancer patients, that's what I'm for."

In the Fiszbein Lab, she studies gene expression—how mRNA transmits genetic blueprints from the DNA in the heart of a cell, the nucleus, to its construction site, the cytoplasm, a semifluid substance that fills the cell.

"All our cells have the same DNA, but different cells express different genes—that's the reason why they are so different," says Fiszbein. "A cell in the top of my nose and the top of my finger are very different, but they have the exact same DNA sequence."

From 24,000 genes, we can make around 100,000 different proteins, the life-giving molecules that make up our skin, bones, and muscles and help us fight infection, digest food, and utilize oxygen. Some genes are specialists, producing just one type of protein, others can generate hundreds using a process called alternative splicing. By deepening our knowledge of how mRNA carries directions and how they're put to work, Fiszbein hopes to better understand what happens when the genetic process goes awry.

"I work on when and why our genes are turned on or off, trying to understand the exact molecular mechanisms that make a cell express one gene or another," says Fiszbein, who has received funding from the Massachusetts Life Sciences Center and BU's Rafik B. Hariri Institute for Computing and Computational Science & Engineering. "I focus on cancer: what is different in terms of gene expression, specific expression between a normal tissue and a cancer tissue. What is wrong, what's happening, why these molecular mechanisms change, what triggers that."

In some studies, Fiszbein and her team look at one gene in detail. In others, they use computing power and machine learning to look at what's happening across the entire genome, a vast amount of data.

"We mix experimental and computational work," says Fiszbein. She first landed in biology after working at the Buenos Aires Zoo in her native Argentina. After studying physiology, molecular biology, and biotechnology, she moved to the United States for a postdoc in computational biology at MIT. "My mom studied computer science and my grandad was a mathematician, so maybe I picked up a little bit of that background."

Fiszbein's dual approach is also mirrored in the expertise of the students working in her lab. As well as graduate students and a postdoctoral researcher, she has six undergraduates involved in research projects. Two are biology majors helping with the single gene experiments, while four—who either minor or major in computer science—grapple with the data generated by the broader studies.

"They have amazing ideas," says Fiszbein, a recent innovation career development professorship awardee. "I really enjoy working with undergrads at BU."

In a recent study, Fiszbein found that the journey from gene to protein doesn't flow in just one direction. When it comes to alternative splicing, instructions can be passed back from a protein to support development elsewhere in the body: "The mRNA processing feeds back to transcription and mRNA synthesis," she says.

"During cancer progression, there are many genes where we can change this splicing," says Fiszbein. Eventually, it may be possible to teach the body to reject a cancer's harmful cell differentiation instructions. "We're trying to first understand what's going on and then we develop strategies to manipulate that."

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My Walking Thoughts for January 30 2022