Ode to E Pluribus Unum for Sunday July 6 2025

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Rubin's Galaxy

Image Credit: NASA, ESA, B. Holwerda (University of Louisville)

In this Hubble Space Telescope image the bright, spiky stars lie in the foreground toward the heroic northern constellation Perseus and well within our own Milky Way galaxy. In sharp focus beyond is UGC 2885, a giant spiral galaxy about 232 million light-years distant.

Some 800,000 light-years across compared to the Milky Way's diameter of 100,000 light-years or so, it has around 1 trillion stars. That's about 10 times as many stars as the Milky Way.

Part of an investigation to understand how galaxies can grow to such enormous sizes, UGC 2885 was also part of An Interesting Voyage and American astronomer Vera Rubin's pioneering study of the rotation of spiral galaxies. Her work was the first to convincingly demonstrate the dominating presence of dark matter in our universe.

A new U.S. coin has been issued to honor Vera Rubin, while the Vera C. Rubin Observatory is scheduled to unveil images from its first look at the cosmos on June 23.

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Better Angels

Lincoln ended his First Inaugural Address with this plea:

nancyebaily.com

I am loath to close. We are not enemies, but friends. We must not be enemies. Though passion may have strained it must not break our bonds of affection. The mystic chords of memory, stretching from every battlefield and patriot grave to every living heart and hearthstone all over this broad land, will yet swell the chorus of the Union, when again touched, as surely they will be, by the better angels of our nature.

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Chords & Riffs

The Jazz Guitarist Barney Kessel (1923-2004)

gettyimages.fi

In a near six-decade career, he was rated the #1 guitarist in Esquire, Downbeat and Playboy magazine polls between 1947 and 1960. Barney Kessel, a pioneer of the electric guitar and a master of harmonic improvisations, also recorded over fifty albums including a number of innovative albums with drummer Shelly Manne and bassist Ray Brown that were remarkable for the lack of a pianist. He also performed with the Oscar Peterson Trio and ensembles with Charlie Parker, Charlie Barnet, Art Tatum and Artie Shaw, and with performers Elvis Presley, Liberace and The Beach Boys.

Leaving the jazz world for studio work, between 1967 and 1970, he operated Barney Kessel's Music World in Hollywood, but, in 1972, he returned to full-time stage work. A stroke in 1992 curtailed his career.

Kessel was rated the No. 1 guitarist in Esquire, DownBeat, and Playboy magazine polls between 1947 and 1960.

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Harbanera (Carmen) https://youtu.be/AaNYz-wD-jE
Autumn Leaves https://youtu.be/BAsEfhU2Ehg?list=RDBAsEfhU2Ehg
Kessel Bossa Nova https://youtu.be/cpDAX7UfAEc?list=RDcpDAX7UfAEc
Easy Like https://youtu.be/LcICcEOiX4c?list=PLBnC5xku-k6xbOudgdfTTAfAW1EXCD0js
One Mint Julip https://youtu.be/IAL5xD6fGHU?list=RDIAL5xD6fGHU
Accustomed to Her Face https://youtu.be/arG5ZT9OCw4?list=RDarG5ZT9OCw4&t=1
Mezzo Archive 79 https://youtu.be/wvM5KNgrvR4?list=RDwvM5KNgrvR4&t=15
Alfie https://youtu.be/YMvI3R2HHKg?list=RDYMvI3R2HHKg

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FLASHMOB CENTRAL

Prague FlashMob

youtube

https://youtu.be/kFAoGR6PK7E?t=3

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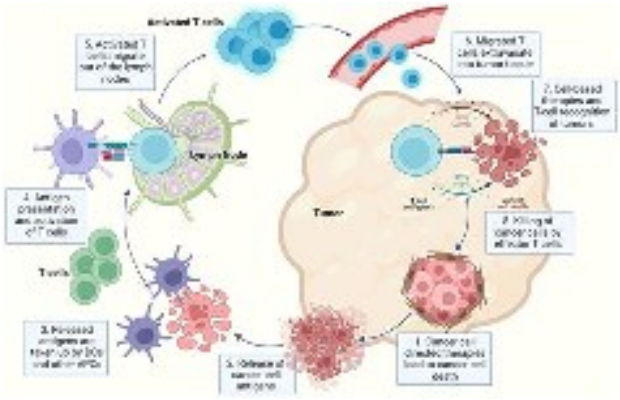
A Battery-Powered, Tumor-Activated Treatment for Cancer



frontiersin.org

While chemotherapy uses drugs to directly kill cancerous cells, immunotherapy harnesses the body's natural defenses by training a patient's own immune system to seek out and destroy tumors. Unfortunately, existing immunotherapies don't always give the immune system enough support, and the complex ecosystem of cells, blood vessels, proteins, and other components that surround tumors inside the body—known as the tumor microenvironment (TME)—can suppress immune responses, preventing these treatments from working effectively.

Now, scientists have found a way to turn this obstacle into an advantage: an implantable battery made of zinc and manganese dioxide that continuously pumps metal ions into tumor cells to kickstart a targeted response from the immune system . The battery relies on body fluids found within the TME to function, so it only becomes active in cancerous tissue while minimizing side effects. When implanted into a mouse model of breast cancer, the battery gave the animals' immune systems a major boost, and slowed the growth of tumors at a rate of 99.6% after 14 days of treatment. "Overall, this implanted battery serves as a localized therapeutic device that offers a unique approach to regulate the TME and activate immunity," the team writes. "This positions it as a promising electrochemical immunotherapy approach for drug-free tumor therapy."

https://bit.ly/4jreSmP

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The Strange Inevitability of Evolution

Good solutions to biology's problems are astonishingly plentiful.

Nautilus

Is the natural world creative? Just take a look around it. Look at the brilliant plumage of tropical birds, the diverse pattern and shape of leaves, the cunning stratagems of microbes, the dazzling profusion of climbing, crawling, flying, swimming things. Look at the "grandeur" of life, the "endless forms most beautiful and most wonderful," as Darwin put it. Isn't that enough to persuade you?

Ah, but isn't all this wonder simply the product of the blind fumbling of Darwinian evolution, that mindless machine which takes random variation and sieves it by natural selection?

Well, not quite. You don't have to be a benighted creationist, nor even a believer in divine providence, to argue that Darwin's astonishing theory doesn't fully explain why nature is so marvelously, endlessly inventive.

As the biologist Hugo de Vries wrote in 1905, "natural selection may explain the survival of the fittest, but it cannot explain the arrival of the fittest."

How does evolution find workable solutions when it lacks the means to explore even a small fraction of the options? And how does evolution find its way from an existing solution to a viable new one—how does it create? The answer is, at least in part, a simple one: It's easier than it looks. But only because the landscape that the evolutionary process explores has a remarkable structure, and one that neither Darwin nor his successors who merged Darwinism with genetics had anticipated.

The role of random drift in evolution has been long recognized, and recently evolutionary biologist John Tyler Bonner has argued that it may be more important than previously thought, especially for small organisms whose wide variety of shapes and structures—think of the microscopic marine organisms such as diatoms and radiolarians—do not necessarily reflect any adaptive fine-tuning. The apparent creativity and artistry of such forms has astonished biologists and inspired artists. Now it seems we can understand where this diversity and inventiveness comes from.

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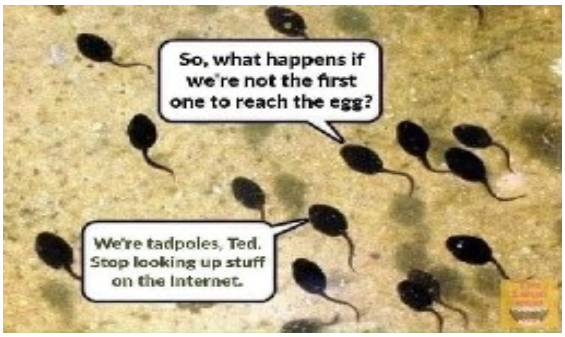

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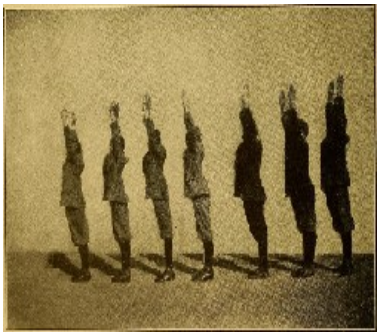
Yes, You Should Stand Up Straight—for All Sorts of Reasons

Slouching is bad for both your physical and emotional health. It's never too late to start paying attention.



Most people have no idea how bad their posture is, say physical therapists and doctors.
Photo: Alamy

Beyond basic aesthetics, good posture—an erect, balanced bearing—determines the ease and efficiency with which you move your body. Less well-known is that good posture is also essential for optimal circulation, respiration, digestion and bladder function. Increasing evidence suggests it also improves cognitive ability and enhances your mood.

- Good posture improves circulation, respiration, digestion and bladder function. It also enhances cognitive ability and mood.
- To improve posture, become aware of your body position, stand against a wall to align yourself, and perform dynamic stretching exercises.
- Upright posture is associated with confidence, self-esteem, and reduced anxiety. Physical therapists can help develop personalized plans to improve posture.

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Tesla's Robotaxi Faces Key Month of Testing and Rollout

A Tesla Cybercab prototype at a Tesla store last November in San Jose, California.
Photographer: David Paul Morris/Bloomberg

Tesla TSLA.O is set to begin a test of its long-promised robotaxi service on schedule in Austin, Texas, by the end of June, Chief Executive Elon Musk said on Tuesday, even as the company faces safety questions from a U.S. regulator.

The electric vehicle maker will roll out about 10 self-driving cars in some parts of the city, and scale up to about a thousand within a few months, Musk told CNBC in an interview.

"We are actually going to deploy not to the entire Austin region, but only the parts that are the safest."

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Watch Google's Ping Pong Robot Beat Humans

Advanced table tennis players still have the upper hand—for now.

The robot can't best advanced level players at the moment.
Credit: Google DeepMind

Humans have firmly retained their lead over robots at table tennis for over 40 years, but recent advancements at Google DeepMind suggest our days of dominance may be numbered. As detailed in a preprint paper released on August 7, researchers have designed the first-ever robotic system capable of amateur human-level performance in ping pong—and there are videos to prove it.

"The robot has to be good at low level skills, such as returning the ball, as well as high level skills, like strategizing and long-term planning to achieve a goal," Google DeepMind explained in an announcement thread posted to X.

https://youtu.be/abi84lnjNV4

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Wireless E-Tattoos Help Manage Mental Workload

Tracking mental workload The e-tattoo combines adhesive electrodes with a flexible printed circuit module to provide stable and high-fidelity EEG/EOG measurements.
(Courtesy: Device/Huh et al.)

Managing one's mental workload is a tricky balancing act that can affect cognitive performance and decision making abilities. Too little engagement with an ongoing task can lead to boredom and mistakes; too high could cause a person to become overwhelmed.

For those performing safety-critical tasks, such as air traffic controllers or truck drivers for example, monitoring how hard their brain is working is even more important – lapses in focus could have serious consequences. But how can a person's mental workload be assessed? A team at the University of Texas at Austin proposes the use of temporary face tattoos that can track when a person's brain is working too hard.

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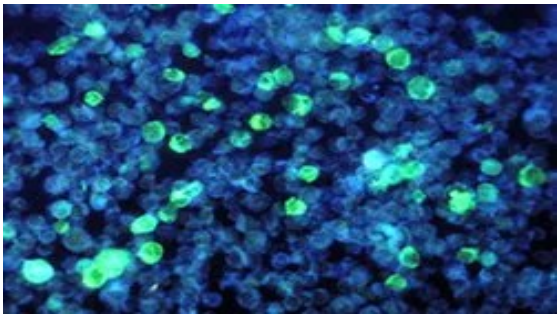
Epstein-Barr Virus (EBV)

EBV was long dismissed as a mild rite of passage, until a 2022 study suggested a link to multiple sclerosis. Researchers now believe EBV plays a role in lupus, certain cancers, rheumatoid arthritis and even long Covid.



Light-colored cells are leukemia cells that contain EBV
Source: CDC

The Epstein-Barr virus (EBV) is a member of the herpes virus family (human herpesvirus 4). EBV is found worldwide and is a common cause of viral pharyngitis, especially in young adults.

EBV is transmitted from person to person and then infects human B cells, which in turn spread the infection throughout the entire reticuloendothelial system (RES, or the liver, spleen, and peripheral lymph nodes).

About 50% of the population has antibodies to the virus by age 5; about 12% of susceptible adults (college-age) develop antibodies to the virus, and one-half of those adults develop the disease termed mononucleosis (also termed infectious mononucleosis, mono, glandular fever, and kissing disease), which produces symptoms of lymph node, spleen, and liver swelling, fever, inflamed throat, malaise, and rash.

The cause of an Epstein-Barr virus infection or mono is the infection of circulating B cells by EBV and the body's response to the presence of the virus. Risk factors include

- intimate contact with body secretions (primarily mouth secretions but including other body fluids like those found in the cervix and semen);
- young age (children, adolescents, and young adults are most often infected);
- sharing items such as eating utensils, toys, or toothbrushes;
- rarely, blood transfusions or organ transplants.

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Four of Fank Lloyd Wright's Most Iconic Designs

B. David Cathell / Alamy Stock Photo

How many architects can you name off the top of your head? Whether that list is on the long or short side, we'd bet Frank Lloyd Wright nabbed a spot. That's no small thing, considering he died April 9, 1959, at age 91. But 66 years after his passing, he remains one of the most well-known architects of our time.

"The mission of an architect is to help people understand how to make life more beautiful, the world a better one for living in, and to give reason, rhyme, and meaning

to life," Wright said of the purpose behind his work, per the Frank Lloyd Wright Foundation.

In honor of Wright's birthday today, we're exploring four of the 532 buildings that were constructed from his celebrated designs, including Taliesin West, the desert-inspired winter home and school he built in Scottsdale, Arizona (pictured here).

https://bit.ly/43LtuYo

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Let AI Do Your Business Phone Calls? Why Not

AI is calling—and it just crossed over the uncanny valley…

unicomcorp.com

Say hi to Bland.AI, the world's most realistic AI phone-calling agent. Chances are, you've already spoken to it without even noticing. It understands emotions, responds in any voice or language, and already handles 1m+ phone calls simultaneously, 24/7.

For enterprises, it's been a financial game changer across sales, operations, customer support—you name it. It's like the perfect employee, so expect major shifts in international and US jobs.

Pretty wild, huh? Here, give it a call yourself.

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Simulations Reveal Secret To Strengthening Carbon Fiber

Stronger than steel and lighter than aluminum, carbon fiber is a staple in aerospace and high-performance vehicles — and now, scientists at the Department of Energy's Oak Ridge National Laboratory have found a way to make it even stronger.

ORNL researchers found a way to double the tensile strength of carbon-fiber composites by reinforcing the material with a thin layer of PAN nanofibers. A human hair is approximately 100 times wider than one of these fibers.
Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

ORNL researchers simulated 5 million atoms to study a novel process for making carbon-fiber composites stronger and more cost efficient by incorporating a reinforced layer of polyacrylonitrile nanofibers, or PAN nanofibers. Led by ORNL's Carbon and Composites group, the team combined fundamental science with molecular dynamics simulations using the Frontier supercomputer to better understand how the reinforcement process works at the atomic scale. Their findings, published in the journal Advanced Functional Materials, could lead to new, ultradurable materials for airplanes, vehicles and a wide range of manufacturing applications that require stronger, more lightweight materials.

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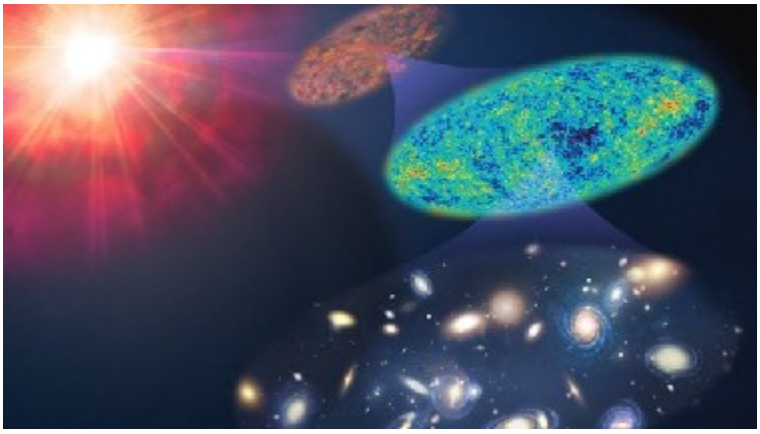
Did Light Exist at the Beginning of the Universe?

Nowadays, the dark of night is interspersed with the light of stars. But before the stars were born, did light shine at the beginning of the universe?



Light didn't emerge unfettered after the Big Bang. Here, we see the phases following the Big Bang (top left), about 13.8 billion years ago, to present day (lower right).
(Mark Garlick/Science Photo Library via Getty Images)

The short answer is "no." But the long answer reveals light's extraordinary journey. At first, the early universe's light was "trapped," and it took several hundred thousand years for it to escape. Then, it took about 100 million years for stars to form.

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Moths That Use the Stars to Navigate

Bogong moth
hitchannel.com

An Australian moth follows the stars during its yearly migration, using the night sky as a guiding compass, according to a new study.

Since stars appear in predictable patterns each night, scientists suspected they might help lead the way. They placed moths in a flight simulator that mimicked the night sky above them and blocked out the Earth's magnetic field, noting where they flew. Then they scrambled the stars and saw how the moths reacted.

When the stars were as they should be, the moths flapped in the right direction. But when the stars were in random places, the moths were disoriented. Their brain cells also got excited in response to specific orientations of the night sky.

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Photos of the Great Masked Ball in Versailles

Costumed guests run in the gardens of the Versailles castle before the Great Masked Ball in Versailles, outside Paris, Saturday, June 21, 2025.
(AP Photo/Christophe Ena)

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Let 'em eat bread

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How Rivian Reduced Electrical Wiring by 1.6 Miles and 44 Pounds

The EV maker reduces software and hardware complexity with zonal electrical architecture.

Switching from domain-based to zonal architecture allowed the company to reduce its complexity and improve scalability.
Image: Rivian

Rivian's second-generation R1T pickup and R1S SUV will maintain their distinctive look, with playful headlamps and a sleek exterior shape. Underneath the surface is where the magic is taking place, specifically a wholly new electrical architecture the brand says is less costly and easier to service.

Rivian senior vice president of electrical hardware Vidya Rajagopalan says the new electrical system offers more features, as well as an increase in sensing and computing capability. In the process of making the transition from Gen 1 to Gen 2 R1 vehicles, Rivian switched to a zonal architecture.

Weight is a big deal for EVs, as it has a direct correlation to battery performance. Plus, the company claims a 20 percent savings in material costs and 15 percent reduction in its carbon footprint between Gen 1 and Gen 2.

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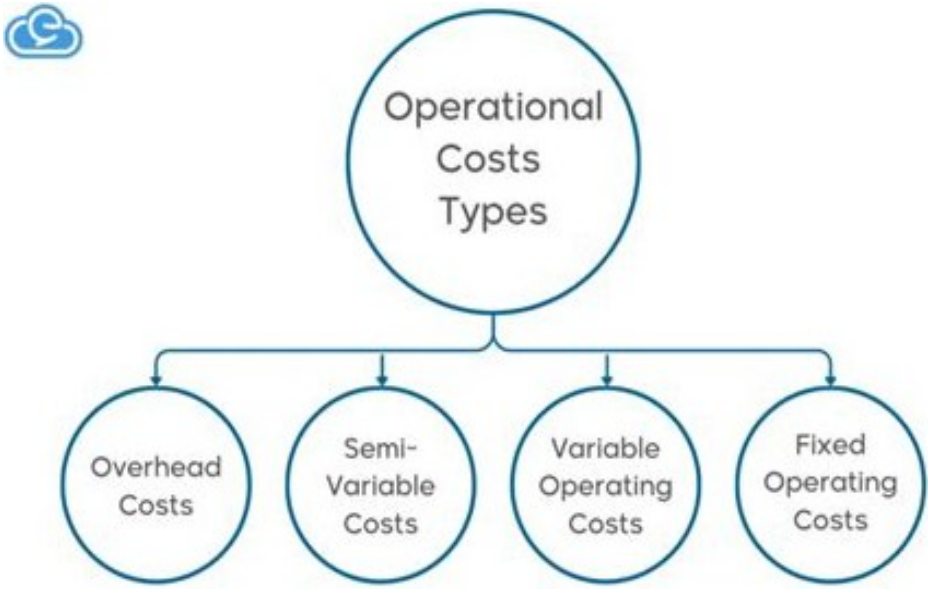
What Does It Cost The IRS to Collect Taxes?

In 2023, it cost the IRS 34 cents to collect each $100.



gatedara.com

Collecting trillions of dollars from a population of 336 million people and around 35 million businesses is no small project. The IRS's staff of 82,990 people collects and evaluates returns, issues refunds, offers taxpayer assistance, oversees tax-exempt organizations, and enforces tax law.

The IRS spent $16.1 billion on operating costs in 2023, 65% of which went to salaries and benefits for the agency's staff. The other 35% paid for information services, infrastructure, rent and utilities, equipment, travel, and more.

After adjusting for inflation, IRS operating costs have fluctuated between just under $14 billion and just over $17 billion since the 1990s. The $16.1 billion total in 2023 was the highest since 2011.

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Axiom-4 Astronauts Visit International Space Station

The crew of Axiom Space's Ax-4 mission to the International Space Station. From left to right: mission specialist Tibor Kapu; pilot Shubhanshu Shukla, commander Peggy Whitson, and mission specialist Sławosz Uznański.
(Image credit: SpaceX)

Houston-based Axiom Space launched its fourth crewed mission to the International Space Station (ISS) early Wednesday (June 25), lifting off on a SpaceX Falcon 9 rocket from NASA's Kennedy Space Center (KCS), in Florida. The mission lifted off from KSC's Launch Complex-39A at 2:31 a.m. EDT (0631 GMT).

After a particularly long orbital chase — 28 hours between launch and rendezvous — the crew's Dragon spacecraft docked with the space station Thursday morning, at 6:31 a.m. (1031 GMT).

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The Bizarre German Aircraft with an Identity Crisis: The BV 155

First conceived by Messerschmitt as a carrier-borne fighter, the Me 155 morphed into a high-speed attack plane and later a high-altitude interceptor known as the Blohm & Voss BV 155.

The single BV-155B V2 built. An unusual design, of note is the large radiator intakes slung below the wings, the extended wingspan for high-altitude performance, and the rearward sliding canopy along with the unusual exhaust routing down the sides of the fuselage in external ducts.
(Image Credit: Source unknown, possibly German Luftwaffe or Blohm and Voss)

Blohm & Voss were well-known shipbuilders as well as successful at building sea planes, but the firm was somewhat new to interceptor/fighter aircraft. A team led by Dr. Richard Vogt determined the Me 155 project had too many flaws to produce an effective high-altitude fighter, resulting in worsening relations and increased friction between Messerschmitt and Blohm & Voss.

Blohm & Voss had been directed by the German Air Ministry to begin construction of the aircraft with Vogt obtaining Messerschmitt's blessing for any changes to the existing design. The two sides failed to reach any agreement and eventually Dr. Vogt presented the RLM a list of redesigns that was quite extensive.

https://bit.ly/44BhhHh

A German aircraft carrier and birds to go with it? Is there now end to NAZI ingenuity?

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Which Animals Can Count and Understand Simple Math?

Crows are known to count out loud and even understand the concept of zero.
(Phichaklim1 via Getty Images)

"Many species, including insects, mollusks, lizards, birds and many types of mammals (land living and sea living) can discriminate between quantities of things," Michael Beran, a professor of psychology at Georgia State University, told Live Science in an email. This ability has the evolutionary benefit of helping animals find more food, thus helping them stay alive and pass on their genes.

For instance, research has shown that honeybees (Apis mellifera) count landmarks while flying toward nectar-rich flowers. Golden orb weaver spiders (Nephila clavipes) keep track of how many insects are caught in their webs

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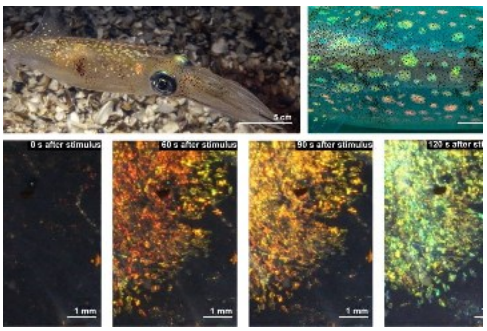
Cell Structures that Squids Use to Change Their Appearance

Inspired by new knowledge, researchers develop tunable, multispectral composite material



Digital camera images of the entire body (top left) and dorsal mantle (top right) of a squid show the splotches' blue, green, yellow, orange and red iridescent (angle-dependent) colors. An individual splotch (bottom, from left) transitions from transparent to red to orange to green at 0, 60, 90 and 120 seconds, respectively, when subjected to chemical and neurophysiological stimuli.
Gorodetsky lab / UC Irvine

By examining squid skin cells three-dimensionally, a University of California, Irvine-led team has unveiled the structures responsible for the creatures' ability to dynamically change their appearance from transparent to arbitrarily colored states.

In a paper published today in Science, the researchers discussed how they took inspiration from the cells and their internal columnar structures to develop a multispectral composite material with adjustable visible and infrared properties.

The team used holotomography, a microscopy technique that combines low-intensity light with quantitative phase imaging to create 3D images of clustered and individual cells. The instrument directly measures subtle shifts in light as it passes through the tissue and constructs a refractive index map of the sample, revealing structural and biochemical features.

https://bit.ly/44maKPp

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The Incredibly Advanced Engineering of the B-2 Bomber

slashgear.com

At $2 billion per aircraft, the Northrop B-2 Spirit is the most expensive plane ever built. But how does this giant become invisible to radar? And why does it look like it flew straight out of a sci-fi movie?

https://bit.ly/3GqprJf

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Avoid Lost Luggage With 7 Travel Tips From Unclaimed Baggage

Unclaimed Baggage

Planning to fly somewhere soon? You and just about everyone else. The Federal Aviation Administration predicted in May that 2025 will be the busiest summer for air travel in the past 15 years, with many days exceeding 50,000 flights.

That means a ton of luggage will also be hurtling through the sky, stowed in overhead bins, under seats, and in cargo holds. The vast majority will end up exactly where it's supposed to, but unfortunately, a small percentage won't — and that's where Unclaimed Baggage comes in.

Located in Alabama, the 50,000-square foot tourist hot spot buys up unclaimed items that were misplaced during air travel and sells them at a massive discount. In its annual Found Report, the store details some of its most unusual finds of the past year. The retailer also provides some tips in the report to help travelers avoid having their possessions wind up on its shelves, and in an email with Nice News, it offered a few more.

Suggestion No. 1? Avoid the disappearing suitcase. According to experts at Reunitus, the world's leading lost and found solution, black, hard-sided suitcases are used by almost half of world travelers. With so many look-alikes, it's easier for airlines to misplace and travelers to mistake for their own. Pro tip: Skip the black or make your bag stand out. Add a bright tag, patterned strap, patch, or bold sticker. Get six more tips from Unclaimed Baggage.

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Jeremy Clarkson's Iconic Nürburgring Lap

When Jeremy pushed the diesel engine in the Jaguar S Type to its limits around the Nürburgring.

Jeremy gets Sabine Schmitz to admit he's only 80% incompetent.

https://youtu.be/9Z16_jIciOM

Now let's see what Sabine can do with a van with only 136 hp.

https://youtu.be/5KiC03_wVjc

Tribute to Sabine Schmitz.

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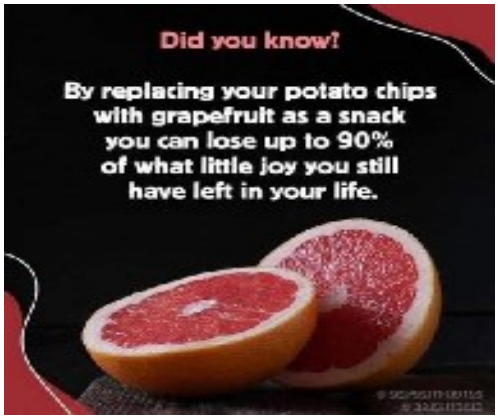

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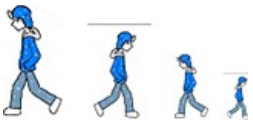
My Walking Thoughts



For Sunday July 6 2025

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As America Enters its 250th Year

In the wake of Friday's 249th birthday, we find ourselves as always on the cusp of controversy, opportunity, and change. So as I walked along a pathway at Ventura's Channel Islands National Park on Thursday, I found myself wondering what markers of the past might serve as guideposts for the future?

In broad form, since July 4, 1776, the US has grown from 13 colonies with 2.5 million people to 50 states and 14 territories with over 342 million people connected by roughly 5,000 airports, 4 million miles of roads, 140,000 miles of train tracks, and 5.5 million miles of power lines. But to me the real measures of American accomplishment lie in the technological prowess of individual citizens, and the amazing ability of the entire nation to pull together in times of crisis. Of the former let's consider the former.

America's Technological Scorecard (*I borrowed this from American Experience with a few amendments*)

1752 Lightning Rod
Benjamin Franklin's electricity experiments lead him to a valuable application — the lightning rod, which when placed at the apex of a barn, church steeple, or other structure, conducts lightning bolts harmlessly into the ground.

1776 Submarine
David Bushnell's "Turtle" submerges by taking water into its tanks and reverses the process to rise. It moves by means of a hand crank propeller. The "Turtle" is used in an attack on Lord Howe's Flagship "Eagle," but attempts to attach a mine to the Eagle's hull fail.

1794 Cotton Gin
Eli Whitney patents his machine to comb and deseed bolls of cotton. His invention makes possible a revolution in the cotton industry and the rise of "King Cotton" as the main cash crop in the South, but will never make him rich. Instead of buying his machine, farmers built bogus versions of their own.

1797 Interchangeable Parts
Eli Whitney contracts to manufacture 10,000 muskets for the U.S. Army. At the time, an entire musket would be made by a single person, without standardized measurements. Whitney divided the labor into several discrete steps and standardized parts to make them interchangeable.

1801 Steam-Powered Pumping Station
The Fairmount Water Works harnesses steam power to provide water for the city of Philadelphia.

1803 Spray Gun
Dr. Alan de Vilbiss of Toledo, Ohio, invented this device to replace swabs as the method of applying medication to oral and nasal passages.

1805 Amphibious Vehicle
Oliver Evans' "Orukter Amphibolos" dredges the waters near the Philadelphia docks. Its steam-powered engine drove either wooden wheels or a paddle wheel. Evans demonstrated his machine in Philadelphia's Center Square, where he passed the hat for money.

1807 Steamboat
Robert Fulton, former miniaturist and landscape painter, opens American rivers to two-way travel. His steamboat the "Clermont" travels 150 miles upstream between New York and Albany at an average speed of 5 mph.

1813 Armored Warship
Steam power enhances military power. Robert Fulton's "Demolos" sails. At 140 ft. in length, it carries a thirty 32-pound cannon.

1814 Plough
Farmers had furrowed the rocky soil of New England with wooden-tipped ploughs. John Jethro Woods of Poplar Ridge, New York, creates a plough with a replaceable cast-iron tip, making farming in America easier.

1817 Erie Canal
Overland travel in the 1800s is slow and arduous. Engineers propose a plan to supplement natural water systems by digging a 363 mile canal to connect the Hudson River with Lake Erie. The "Seneca Chief" will make the inaugural run through the Erie Canal in 1825.

1818 Profile Lathe
Thomas Blanchard of Middlebury, Connecticut, builds a woodworking lathe that does the work of 13 men. His invention helps to lower wood prices.

1830 Electro-magnetic Motor
Joseph Henry, Professor of Mathematics and Natural Science at the Albany Academy, builds a motor employing the electromagnet, invented by William Sturgeon in London just five years earlier. Henry's motor has no practical use.

1831 Reaping Machine
The McCormick Reaper, which cut grain much faster than a man with a scythe, failed to catch on. McCormick sold the first unit around 1840; by 1844, only 50 had sold. After taking his operation to Chicago, McCormick prospered. By 1871 his company was selling 10,000 reapers per year.

1833 Sewing Machine
Walter Hunt invents the first lock-stitch sewing machine, but loses interest and does not patent his invention. Later, Elias Howe secures patent on an original lock-stitch machine, but fails to manufacture and sell it. Still later, Isaac Singer infringes on Howe's patent to make his own machine, which makes Singer rich. Hunt also invents the safety pin, which he sells outright for $400.

1834 Threshing Machine
John A. and Hiram Abial Pitts invent a machine that automatically threshes and separates grain from chaff, freeing farmers from a slow and laborious process.

1836 Revolver
To finance the development of his "six shooter," Samuel Colt traveled the lecture circuit, giving demonstrations of laughing gas. Colt's new weapon failed to catch on, and he

went bankrupt in 1842 at age 28. He reorganized and sold his first major order to the War Department during the Mexican War in 1846, and went on to become rich.

1837 Power Tools
Thomas Davenport of Brandon, Vermont, is one of the first to find a practical application for the electric motor. He uses a motor he built to power shop machinery and also builds the first electric model railroad car.

1842 Ether Anesthesia
Crawford Williamson Long, of Jefferson, Georgia, performs the first operation using an ether-based anesthesia, when he removes a tumor from the neck of Mr. James Venable. Long will not reveal his discovery until 1849.

1843 Vulcanized Rubber
Rubber, so named because it could erase pencil, had long been considered a waterproofing agent, but in its natural state, it melted in hot weather and froze solid in the cold. After ten years of tireless work and abject poverty, Charles Goodyear perfects his process for "vulcanizing" rubber, or combining it with sulfur to create a soft, pliable substance unaffected by temperature.

1844 Telegraph
Samuel F.B. Morse demonstrates his telegraph by sending a message to Baltimore from the chambers of the Supreme Court in Washington, DC. The message, "What hath God wrought?," marks the beginning of a new era in communication.

1846 Cylinder Printing Press
Richard M. Hoe creates a revolution in printing by rolling a cylinder over stationary plates of inked type and using the cylinder to make an impression on paper. This eliminated the need for making impressions directly from the type plates themselves, which were heavy and difficult to maneuver.

1857 Passenger Elevator
Elisha Graves Otis dramatically demonstrates his passenger elevator at the Crystal Palace Exposition in New York by cutting the elevator's cables as it ascends a 300 foot tower. Otis' unique safety braking system prevents the elevator from falling; his business prospects rise.

1859 Oil Well
Drilling at Titusville, Pennsylvania, "Colonel" Edwin Drake strikes oil at a depth of 69.5 feet. Prior to that, oil, which had been used mostly as a lubricant and lamp fuel, had been obtained only at places where it seeped from the ground. Western Pennsylvania witnesses the world's first oil boom.

1860 Repeating Rifle
B. Tyler Henry, chief designer for Oliver Fisher Winchester's arms company, adapts a breech-loading rifle invented by Walter B. Hunt and creates a new lever action repeating rifle. First known as the Henry, the rifle will soon be famous as simply the Winchester.

1862 Battle of the Ironclads
For the first time, two armored ships battle each other at sea. The Union Monitor, designed from scratch by John Ericsson, features a two-cannon revolving turret and eight-inch plate armor. The Confederate Merrimac, a wooden hulled ship hastily outfitted with iron plates, holds it own against the Monitor. The two battle to a draw.

1864 Oil Pipeline
Built in the oil fields at Pithole, Pennsylvania, Samuel van Syckel's five-mile, pump-operated pipeline made oil transport infinitely easier. No one appreciated this less than the Teamsters, who saw the pipeline as a threat to their business and destroyed it. The determined van Syckel hired a crew of "pipeline protectors" and rebuilt the pipeline.

1865 Web Offset Printing
William Bullock introduced a printing press that could feed paper on a continuous roll and print both sides of the paper at once. Used first by the Philadelphia Ledger, the machine would become an American standard. It would also kill its maker, who died when he accidentally fell into one of his presses.

1867 Barbed Wire
Lucien B. Smith of Kent, Ohio, invents the product that will close down the open cattle ranges by closing in cattle onto individual plots of privately owned land. I.L. Ellwood and Company's Glidden Steel Barb Wire will dominate the market; by 1890 the open range will be only a memory.

1873 Typewriter
Inspired by a Scientific American article featuring a British attempt at a typing machine, Christopher Latham Sholes invents his own. In 1873 he sells an improved prototype to Remington and Sons, gunsmiths, of Ilion, New York, who begin to mass produce the machines. Among the first works to be produced on a typewriter is Mark Twain's "Adventures of Tom Sawyer."

1874 Structural Steel Bridge
Captain James Buchanan Eads finishes the bridge across the Mississippi at St. Louis. Using steel supplied by Andrew Carnegie, Eads incorporates a triple arch design, with spans measuring 502, 520, and 502 feet. The construction amazes the engineering world; Eads will be the first American engineer to be awarded the Albert Medal of the Royal Society of Arts in London.

1875 Mimeograph
While using paraffin in an attempt to invent and improve telegraphy tape, Thomas Alva Edison discovers a way to make duplicate copies of documents instead.

1876 Telephone
Alexander Graham Bell patents his telephone, built with the assistance of young self-trained engineer Thomas A. Watson. Elisha Gray, who developed a similar device at about the same time, will unsuccessfully challenge Bell's patent.

1877 Phonograph
Working with a team of engineers at his Menlo Park, New Jersey, laboratories, Thomas Alva Edison perfects a system of sound recording and transmission. The first recording replayed is a voice saying "Mary had a little lamb its fleece was white as snow."

1879 Incandescent Light Bulb
Backed by $30,000 in research funds provided by investors including J.P. Morgan and the Vanderbilts, Thomas Edison perfects an incandescent light bulb. The first commercial incandescent system will be installed at the New York printing firm of Hinds and Ketcham in January, 1881.

1880 Hearing Aid
R.G. Rhodes improves on the ear trumpet with another primitive hearing aid. The device is a thin sheet of hard rubber or cardboard placed against teeth which conducts vibrations to the auditory nerve.

1885 Skyscraper
After the Great Fire of 1871, Chicago has become a magnet for daring experiments in architecture. William Le Baron Jenney completes the 10-story Home Insurance Company Building, the first to use steel-girder construction; more than twenty skyscrapers will be built in Chicago over the next 9 years.

1888 Kodak Camera
In Rochester, New York, George Eastman introduces a hand-held box camera for portable use. The camera is pre-loaded with 100 exposure film; after shooting the photographer returns the whole camera to the manufacturer for development and a reload.

1891 Escalator
Jesse W. Reno, introduces a new novelty ride at Coney Island. His moving stairway elevates passengers on a conveyor belt at an angle of 25 degrees. The device will be shown at the Paris Exposition of 1900, where it is called the escalator.

1892 Gasoline-powered Car
In a loft in Springfield, Massachusetts, brothers Frank and Charles Duryea fabricate the

first gasoline-powered automobile built in the United States. It will make its first successful run on the streets of Springfield in September, 1893.

1893 Zipper
At the World's Columbian Exposition in Chicago, Whitcomb L. Judson introduces his clasp locker, a hook-and-eye device opened and closed by a sliding clasp. Improvements in the device by other inventors will continue; workers at B.F. Goodrich will coin the name "zipper" in 1923.

1898 Submarine
The J.P. Holland torpedo boat company launches the first practical submarine, commissioned by the U.S. Navy. The test is successful. Holland gets orders for six more.

1902 Air Conditioning
Working as an engineer at the Buffalo Forge Company, Willis H. Carrier designs the first system to control temperature and humidity. He will go on to found his own company, the Carrier Corporation, to produce air-conditioning equipment.

1903 Airplane
At Kitty Hawk, North Carolina, brothers Orville and Wilbur Wright break the powered flight barrier with their gasoline-powered "Flyer I." The first powered, sustained, and controlled airplane flight in history lasts 12 seconds. Wilbur pilots the machine. On a flight later that day, Orville will remain aloft 59 seconds and travel 852 feet.

1908 Model T
Car maker Henry Ford introduces his Model T automobile. By 1927, when it is discontinued, 15.5 million Models T's will be sold in the U.S. Ford owes much of his success to his improved assembly line process, which by 1913 will produce a complete Model T every 93 minutes.

1914 Panama Canal
After 36 years' labor, the bankruptcy of thousands of investors, and the deaths of more than 25,000 men, the Panama Canal is finished. The canal cuts the sailing distance from the East Coast to the West Coast by more than 8,000 miles.

1919 Hydrofoil
Alexander Grahams Bell's "Hydrodome IV" sets a world record of 70 mph for water travel. The boat weighs over 10,000 pounds and uses underwater fins to raise the hull of the boat and decrease drag between the hull and the water.

1920 KDKA
The first regular commercial radio broadcasts begin when AM station KDKA of

Pittsburgh delivers results of the Harding-Cox election to its listeners. Radio experiences immediate success; by the end of 1922, 563 other licensed stations will join KDKA.

1921 Wirephoto
The first electronically-transmitted photograph is sent by Western Union. The idea for a facsimile transmission was first proposed by Scottish clockmaker Alexander Bain in 1843.

1926 Rocket
Robert H. Goddard, Professor of Physics at Clark University in Worcester, Massachusetts, makes the first successful launch of a liquid-fueled rocket at his aunt Effie's farm in Auburn, Massachusetts. The rocket reaches 41 ft. in altitude.

1927 Television
Philo Farnsworth demonstrates the first television for potential investors by broadcasting the image of a dollar sign. Farnsworth receives backing and applies for a patent, but ongoing patent battles with RCA will prevent Farnsworth from earning his share of the million-dollar industry his invention will create.

1931 Radio Astronomy
While trying to track down a source of electrical interference on telephone transmissions, Karl Guthe Jansky of Bell Telephone Laboratories discovers radio waves emanating from stars in outer space.

1932 Defibrillator
Working at the research facilities at Johns Hopkins University, Dr. William Bennett Kouwenhoven develops a device for jump-starting the heart with a burst of electricity.

1938 Nylon
A team of researchers working under Wallace H. Carothers at E.I. du Pont de Nemours & Company invents a plastic that can be drawn into strong, silk-like fibers. Nylon will soon become popular as a fabric for hosiery as well as industrial applications such as cordage.

1939 Digital Computer
John Atanasoff and Clifford Berry of Iowa State College complete the prototype of the first digital computer. It can store data and perform addition and subtractions using binary code. The next generation of the machine will be abandoned before it is completed due to the onset of World War II.

1942 Atomic Reaction
A team working under Italian refugee Enrico Fermi at the University of Chicago produces the first controlled, self-sustaining nuclear chain reaction. This experiment and others will result in the development of the atomic bomb.

1945 Atomic Bomb
A team led by J.R. Oppenheimer, Arthur H. Compton, Enrico Fermi and Léo Szilard detonates the first atomic bomb at the Los Alamos Lab near Santa Fé, New Mexico. Following the tests, the United States dropped two atomic bombs on Japan -- one at Hiroshima, one at Nagasaki -- that claimed more than 100,000 lives.

1947 Polaroid Camera
Dr. Edwin H. Land introduces a new camera that can produce a developed photographic image in sixty seconds. Land will follow in the 1960s with a color model and eventually receive more than 500 patents for his innovations in light and plastics technologies.

1951 UNIVAC 1
The Eckert and Mauchly Computer Co. of Philadelphia sells the first commercial computer, the UNIVAC 1, to the U.S. Census Bureau. The memory called up data by transmitting sonic pulses through tubes of mercury. An additional 45 UNIVAC 1 machines would eventually be sold.

1953 Heart-lung Machine
Dr. John H. Gibbon performs the first successful open heart surgery in which the blood is artificially circulated and oxygenated by a heart-lung machine. This new technology, which allows the surgeon to operate on a dry and motionless heart, greatly increases surgical treatment options for heart defects and disease.

1955 Nuclear Submarine
The Nautilus, the first nuclear submarine, revolutionizes naval warfare. Conventional submarines need two engines: a diesel engine to travel on the surface and an electric engine to travel submerged, where oxygen for a diesel engine is not available. The Nautilus, the first nuclear sub, can travel many thousands of miles below the surface with a single fuel charge.

1957 Polio Vaccine
Dr. Albert Sabin develops a polio vaccine using strains of polio too weak to cause infection but strong enough to activate the human immune system. His invention will put an end to the polio epidemics that have crippled thousands of children worldwide.

1958 Explorer I
Three months after the Soviet Union began the Space Age by launching Sputnik, the U.S. responds by sending the Explorer I satellite into orbit. Explorer I's mission is to detect radiation; it discovers one of the Van Allen radiation belts.

1960 Laser
Working at Hughes Research Laboratories, physicist Theodore H. Maiman creates the first laser. The core of his laser consists of a man-made ruby -- a material that had

been judged unsuitable by other scientists, who rejected crystal cores in favor of various gases.

1964 Operating System
IBM rolls out the OS/360, the first mass-produced computer operating system. Using the OS/360, all computers in the IBM 360 family could run any software program. Already IBM is a giant in the computer industry, controlling 70% of the market worldwide.

1965 Minicomputer
Digital Equipment introduces the PDP-8, the world's first computer to use integrated circuit technology. Because of its relatively small size and its low $18,000 price tag, Digital sells several hundred units.

1969 Moon Landing
Millions watch worldwide as the landing module of NASA's Apollo 11 spacecraft touches down on the moon's surface and Neil Armstrong becomes the first human to set foot on the moon. President John F. Kennedy, who vowed to the world that the United States would put a human on the moon before 1970, has not lived to witness the moment.

1970 Optical Fiber
Corning Glass announces it has created a glass fiber so clear that it can communicate pulses of light. GTE and AT&T will soon begin experiments to transmit sound and image data using fiber optics, which will transform the communications industry.

1974 Barcode
The first shipments of bar-coded products arrive in American stores. Scanners at checkout stations read the codes using laser technology. The hand-punched keyboard cash register takes one step closer to obsolescence.

1975 Microsoft
Old high school friends Bill Gates and Paul Allen form a partnership known as Microsoft to write computer software. They sell their first software to Ed Roberts at MIT, which has produced the Altair 8800, the first microprocessor-based computer. Gates soon drops out of Harvard.

1976 Super Computer
Cray Research, Inc. introduces its first supercomputer, the Cray-1, which can perform operations at a rate of 240,000,000 calculations per second. Supercomputers designed by Seymour Cray will continue to dominate the market; the Cray 2, marketed in 1985, will be capable of 1,200,000,000 calculations per second.

1981 Space Shuttle
For the first time, NASA successfully launches and lands its reusable spacecraft, the

Space Shuttle. The shuttle can be used for a number of applications, including launch, retrieval, and repair of satellites and as a laboratory for physical experiments. While extremely successful, the shuttle program will suffer a disaster in 1986 when the shuttle Challenger explodes after takeoff, killing all on board.

1982 Artificial Heart
Dr. Robert Jarvik implants a permanent artificial heart, the Jarvik 7, into Dr. Barney Clark. The heart, powered by an external compressor, keeps Clark alive for 112 days.

1983 PC
In January "Time" names its 1982 "man" of the year — the personal computer. PC's have taken the world by storm, dramatically changing the way people communicate. IBM dominates the personal computer market, benefiting both from the production of its own machines as well as "clones" produced by other companies.

1985 Genetic Engineering
The USDA gives the go-ahead for the sale of the first genetically altered organism. The rapidly growing biotech industry will seek numerous patents, including one for a tomato that can be shipped when ripe.

1988 Graphic User Interface
Apple files a suit charging that Microsoft has pirated Apple's user-friendly graphical interface. The suit will fail, and Microsoft's star will continue to rise. By the mid 1990's, Apple will be experiencing a painful and public financial shakeout.

1990 Hubble Telescope
The space shuttle Discovery deploys the Hubble Space telescope 350 miles above the Earth. Although initial flaws limit its capabilities, the Hubble will be responsible for numerous discoveries and advances in the understanding of space.

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E Pluribus Unum: Our Bottom Line

America, a nation often characterized as a bunch self-serving, pleasure seeking, narcissists, has shown itself and the world an amazing ability put away the toys and get down to business. True, this trait is stays hidden in the daily round of things, but it is there in a very special way. Americans at their core believe in freedom… and push-come-to-shove will fight for it. It is part of our DNA, so I for one do not think we have come close to the end of our nation's journey

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