

Ode to Happiness for Sunday April 18 2021

Mars and the Pleiades Beyond Vinegar Hill



Image Credit & Copyright: Kristine Richer

Is this just a lonely tree on an empty hill?

To start, perhaps, but look beyond. There, a busy universe may wait to be discovered.

First, physically, to the left of the tree, is the planet Mars. The red planet, which is the new home to NASA's Perseverance rover, remains visible this month at sunset above the western horizon.

To the tree's right is the Pleiades, a bright cluster of stars dominated by several bright blue stars.

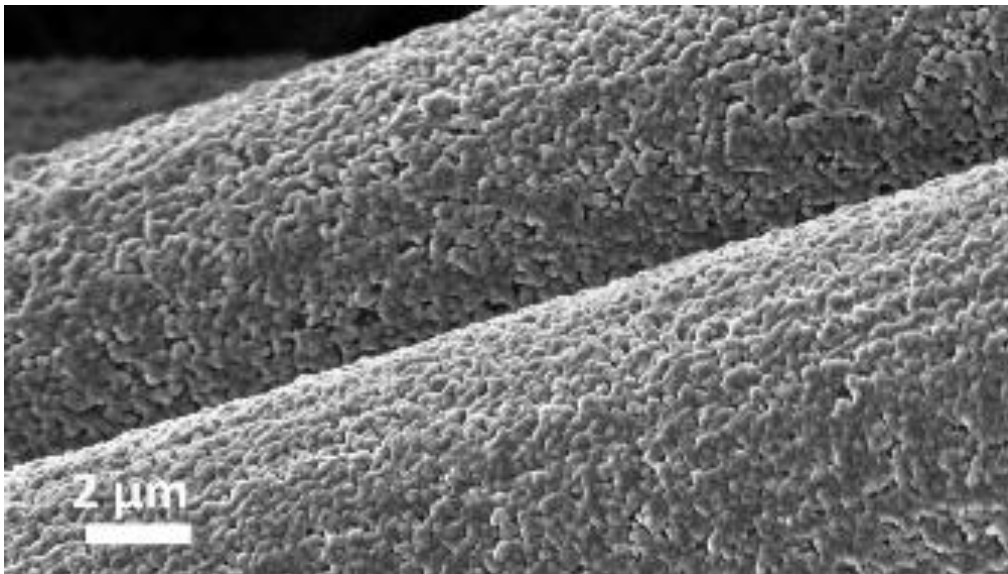
The picture is a composite of several separate foreground and background images taken within a few hours of each other, in early March, from the same location on

Vinegar Hill in Milford, Nova Scotia, Canada. At that time, Mars was passing slowly, night after night, nearly in front of the distant Seven Sisters star cluster. The next time Mars will pass angularly as close to the Pleiades as it did in March will be in 2038.

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Aluminum-anode batteries offer sustainable alternative

By David Nutt



This magnified image shows aluminum deposited on carbon fibers in a battery electrode. The chemical bond makes the electrode thicker and its kinetics faster, resulting in a rechargeable battery that is safer, less expensive and more sustainable than lithium-ion batteries.

The cost of harvesting solar energy has dropped so much in recent years that it's giving traditional energy sources a run for their money. However, the challenges of energy storage – which require the capacity to bank an intermittent and seasonally variable supply of solar energy – have kept the technology from being economically competitive.

Cornell researchers led by Lynden Archer, the Joseph Silbert Dean of Engineering and the James A. Friend Family Distinguished Professor of Engineering, have been exploring the use of low-cost materials to create rechargeable batteries that will make energy storage more affordable. These materials could also provide a safer and more environmentally friendly alternative to lithium-ion batteries, which currently dominate the market but are slow to charge and have a knack for catching fire.

The group previously demonstrated the potential of zinc-anode batteries. Now, they have employed a different approach for incorporating aluminum, resulting in rechargeable batteries that offer up to 10,000 error-free cycles.

Their paper, "Regulating Electrodeposition Morphology in High-Capacity Aluminium and Zinc Battery Anodes Using Interfacial Metal-Substrate Bonding," published April 5 in Nature Energy.

The paper's lead author is Jingxu (Kent) Zheng, Ph.D. '20, currently a postdoctoral researcher at the Massachusetts Institute of Technology.

"A very interesting feature of this battery is that only two elements are used for the anode and the cathode – aluminum and carbon – both of which are inexpensive and environmentally friendly," Zheng said. "They also have a very long cycle life. When we calculate the cost of energy storage, we need to amortize it over the overall energy throughput, meaning that the battery is rechargeable, so we can use it many, many times. So if we have a longer service life, then this cost will be further reduced."

Among the advantages of aluminum is that it is abundant in the earth's crust, it is trivalent and light, and it therefore has a high capacity to store more energy than many other metals. However, aluminum can be tricky to integrate into a battery's electrodes. It reacts chemically with the glass fiber separator, which physically divides the anode and the cathode, causing the battery to short circuit and fail.

The researchers' solution was to design a substrate of interwoven carbon fibers that forms an even stronger chemical bond with aluminum. When the battery is charged, the aluminum is deposited into the carbon structure via covalent bonding, i.e., the sharing of electron pairs between aluminum and carbon atoms.

While electrodes in conventional rechargeable batteries are only two dimensional, this technique uses a three-dimensional – or nonplanar – architecture and creates a deeper, more consistent layering of aluminum that can be finely controlled.

"Basically we use a chemical driving force to promote a uniform deposition of aluminum into the pores of the architecture," Zheng said. "The electrode is much thicker and it has much faster kinetics."

The aluminum-anode batteries can be reversibly charged and discharged one or more orders of magnitude more times than other aluminum rechargeable batteries under practical conditions.

"Although superficially different from our earlier innovations for stabilizing zinc and lithium metal electrodes in batteries, the principle is the same – design substrates that provide a large thermodynamic driving force that promotes nucleation; and runaway, unsafe growth of the metal electrode is prevented by forces such as surface tension that can be massive at small scales," said Archer, the paper's senior author.

Co-authors include doctoral students Tian Tang and Yue Deng; master's student Shuo Jin; postdoctoral researcher Qing Zhao; laboratory manager Jiefu Yin; Xiaotun Liu, Ph.D. '20; and researchers from Stony Brook University and Brookhaven National Laboratory.

The research was supported by the U.S. Department of Energy Basic Energy Sciences Program through the Center for Mesoscale Transport Properties, an Energy Frontiers Research Center, hosted at Stony Brook University. The researchers made use of the Cornell Center for Materials Research, which is supported by the National Science Foundation's Materials Research Science and Engineering Center program.

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Spectacular Footage of a Butterfly Leaving Its Cocoon



The transition from caterpillar to butterfly is a process that consists of four stages: egg, larva, pupa, and adult. Observe one caterpillar as it develops into a gorgeous winged insect. (4:41)

<https://www.youtube.com/watch?v=qiGus6bmgGU>

Source: Smithsonian Channel: Micro Monsters with David Attenborough - Courtship

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SpaceX is Outfitting its Dragon Spacecraft with an Observation Dome for Space Tourists

Darrell Etherington



*SpaceX Crew Dragon with observation window.
Image Credits: SpaceX*

SpaceX is set to make a change to its Crew Dragon spacecraft for its forthcoming history-making all-civilian launch, currently set for September 15. That Dragon will replace its International Space Station docking mechanism with a transparent dome,

through which passengers will be able to take in an awe-inspiring panorama of space and the Earth from an orbital perspective.

The glass dome will be at the “nose” of the Dragon capsule, or its topmost point when it’s loaded upright on top of a Falcon 9 rocket readying for launch. There should be space for one passenger to use it at a time, and it’ll be opened up once the spacecraft is safely out of Earth’s atmosphere, exposed by a protective cover that can be flipped back down to protect the observation deck when the spacecraft re-enters on its return trip.

SpaceX CEO Elon Musk called it “the most ‘in space’ you could possibly feel” in a tweet sharing a concept render of the new modification in use. During a press briefing for the upcoming tourist flight, which is called “Inspiration4” and led by billionaire Jared Isaacman, it was described as being similar to the exiting cupola on the International Space Station in terms of the views it affords.

Check your bank balance before you call for tickets

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Female Cadet Sets New Record for West Point's Punishing Obstacle Course



On March 24, Class of 2022 Cadet Elizabeth Bradley shattered the women’s Indoor Obstacle Course Test record by six seconds, finishing the course in 2 minutes, 20 seconds, breaking the previous mark of 2:26 in 2013. She received an IOCT patch from the Commandant of Cadets Brig. Gen. Curtis Buzzard after her run.

(Photo courtesy of Col. Nicholas Gist/DPE)

Military.com | By Matthew Cox

A female cadet at the U.S. Military Academy at West Point just set a new record on the grueling obstacle course that stands between every student and graduation.

On March 24, Cadet Elizabeth Bradley, Class of 2022, finished the Indoor Obstacle Course Test, or IOCT, in two minutes, 20 seconds, shattering Cadet Class '17 Madaline Kenyon's time of two minutes, 26 seconds, according to a West Point news release.

The exhausting indoor course puts cadets through 11 challenges that include a low crawl under a barrier, tire footwork, a two-handed vault, maneuvering over an eight-foot horizontal shelf and a challenging balance beam event.

Cadets also have to negotiate a 20-foot horizontal ladder and a 16-foot vertical rope climb to the top level of Hayes Gymnasium. The 350-meter sprint on the track includes a six-pound medicine ball sprint, a baton sprint and a final sprint the last 110 meters to the finish line.

"For anyone who has ever experienced the IOCT, there is no doubt that it is a physically and mentally challenging assessment of physical fitness," Col. Nicholas Gist, director of the Department of Physical Education, said in the release. "Regardless of current performance, the expectation is for cadets to continuously strive to demonstrate excellence. The Army and its soldiers deserve and expect leaders of character, and the IOCT is but one opportunity to develop performance-based character in the physical program."

The minimum IOCT graduation requirement is three minutes, 30 seconds for men and five minutes, 29 seconds for women, according to the release. Bradley achieved the highest grade of an A-plus for both the men's and women's standards. Females have to finish in less than three minutes, 11 seconds and males have to beat a score of two minutes, 26 seconds to max the IOCT, according to the release.

About 8%, or 85 cadets, from the Class of 2021 earned the A-plus grade, with an equal representation of men and women.

"Receiving an A-plus grade on the men's scale is a good feeling because no one can tell me I didn't deserve it or had an easier standard," Bradley said in the release.

Bradley, a competitive athlete, started training six weeks out by shifting her typical workout routine toward a speed and anaerobic focus with the goal of beating her score last year of two minutes, 27 seconds. She also trained with Class of 2021 Cadet Trevaun Turner, who broke the men's record for the IOCT with a score of one minute, 54 seconds in 2019, according to the release.

"We did lots of sprint workouts that he did during his preparation," Bradley said. "My improvement from last year to this year was made up almost entirely on the ... track portion of the IOCT. I knew this was the area that I had the most potential to improve just by increasing my speed and fitness."

But Bradley admits the course wasn't much easier this year.

"The balance beam is always a daunting obstacle because it has the most room for error," Bradley said in the release. "If you fall off it, you have to go back and do it again."

"I would say the IOCT is 90% mental. It's probably one of the most challenging physical events we are required to do at West Point. It requires you to push yourself past what you think you are capable of."

Maj. Sarah Ferreira, a Department of Physical Education instructor, has seen thousands of cadets take the IOTC, but Bradley's performance was one of those few that stand apart.

"Cadet Bradley's performance was truly exceptional," Ferreira said in the release. "It was evident that Cadet Bradley's deliberate preparation, focused training efforts and hard work paid off."

"Last year, in 2020, she was one second away from tying the female IOCT record and this year she came back and beat it by six seconds, which is quite a large time margin for the IOCT."

Bradley, who hopes to be selected for the Engineers branch, "really excelled at the horizontal bars and the rope climb," Ferreira said.

"She completed the horizontal bars in under seven seconds and got up the rope in two locks," Ferreira said in the release. "She was extremely efficient with her movements and executed a flawless floor routine, which set her up for success on the track portion of the test."

Bradley doesn't have to take the IOCT next year because she scored an A-plus, but she's determined to break her own record.

"I know it's possible, but it will surely take a lot more training," she said.

-- *Matthew Cox can be reached at matthew.cox@military.com.*

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Zodiacal Light and Mars



Image Credit & Copyright: Joshua Rhoades

Just after sunset on March 7, a faint band of light still reaches above the western horizon in this serene, rural Illinois, night skyscape.

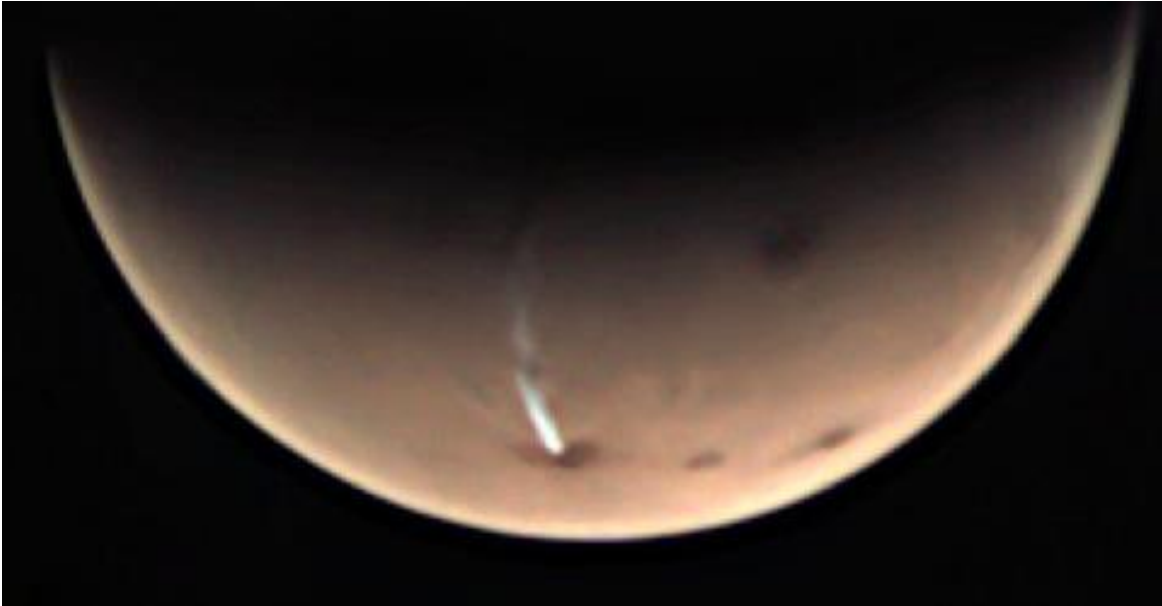
Taken from an old farmstead, the luminous glow is zodiacal light, prominent in the west after sunset during planet Earth's northern hemisphere spring. On that clear evening the band of zodiacal light seems to engulf bright yellowish Mars and the Pleiades star cluster. Their close conjunction is in the starry sky above the old barn's roof.

Zodiacal light is sunlight scattered by interplanetary dust particles that lie near the Solar System's ecliptic plane. Of course all the Solar System's planets orbit near the plane of the ecliptic, within the band of zodiacal light. But zodiacal light and Mars may have a deeper connection. A recent analysis of serendipitous detections of interplanetary dust by the Juno spacecraft during its Earth to Jupiter voyage suggest Mars is the likely source of the dust that produces zodiacal light.

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The Weird Long Cloud on Mars is Reveals Some of its Secrets

By Chelsea Gohd for Space.com



*A Mars Express image of Arsia Mons on Mars and its strange long cloud, taken on July 19, 2020.
(Image credit: ESA/GCP/UPV/EHU Bilbao)*

A European spacecraft is unraveling the secrets of the weird long cloud that has been appearing again and again in the Martian sky for years.

The Arsia Mons Elongated Cloud is a peculiar feature on Mars: a long, bright water ice cloud stretching out over the Martian surface, extending over the planet's Arsia Mons volcano all the way to the volcano Olympus Mons, the tallest mountain in the solar system. The strange phenomenon has been recurring every year around Mars' southern solstice, with the cloud forming and fading daily for 80 or more days at a time on the Red Planet.

However, while the cloud is no new presence, it is challenging to observe in its entirety because of the changing Martian atmosphere and the difficulties of observing from orbit. Still, the European Space Agency's Mars Express orbiter has managed to get an in-depth look at the peculiar cloud using a special tool: the Visual Monitoring Camera (VMC), perhaps better known by its nickname the Mars Webcam.

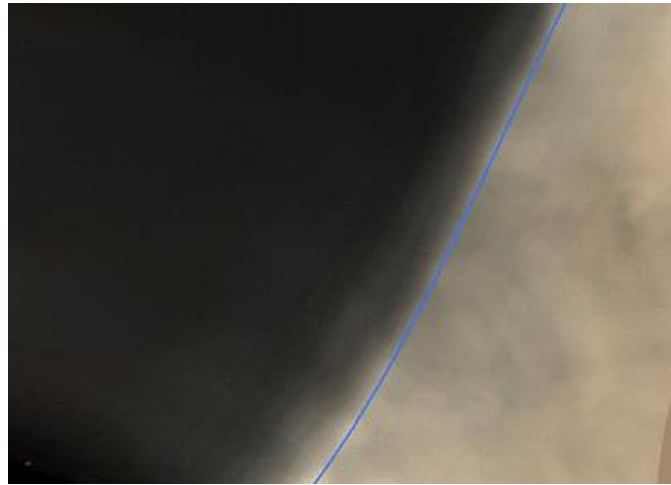
In a new study, astronomers using this data are gleaning new details about the long cloud, including how big it can really get and details of the intricate dynamics at play in the climate system surrounding it.

Cloud-hunting tools

The VMC was originally installed to spot the Beagle 2 lander, a British Mars lander that was declared lost and is speculated to have crashed.

"However, recently, the VMC was reclassified as a camera for science," Jorge Hernández Bernal, an astronomer at the University of the Basque Country in Spain and lead author of this new study of the cloud who also is part of a long-term project studying the cloud, said in a statement.

"Repurposing the VMC has successfully enabled us to understand this transient cloud in a way that wouldn't have been possible otherwise," ESA's Mars Express project scientist Dmitriy Titov said about the VMC in the same statement.



[The Arsia Mons Elongated Cloud.](#)

(Image credit: DSA/GCP/UPV/EHU Bilboa CC BY-SA 3.0 IGO)

The tool allows scientists to "track clouds, monitor dust storms, probe cloud and dust structures in the Martian atmosphere, explore changes in the planet's polar ice caps, and more," Titov added.

For this study, astronomers used both the VMC observations and data from other Mars Express instruments in addition to data from other missions including NASA's Mars Atmosphere and Volatile Evolution (MAVEN) Mars Reconnaissance Orbiter (MRO), the Viking 2 missions and the Indian Space Research Organization's Mars Orbiter Mission (MOM).

"We were especially excited when we dug into Viking 2's observations from the 1970s," Bernal said. "We found that this huge, fascinating cloud had already been partially imaged that long ago — and now we're exploring it in detail."

Cloudy clues

The researchers found that, at its largest, the cloud measures out to be about 1,118 miles (1,800 kilometers) long and 93 miles (150 km) across. The cloud is "orographic," meaning it forms when wind is pushed upward by surface features like mountains (in this case, Arsia Mons), and is the largest cloud of this type ever seen on the planet.

The cloud is also highly dynamic, they found, forming before sunrise then expanding rapidly for two and a half hours. It can grow at a mind-boggling speed of over 373 mph (600 kph) before it stops expanding. It then detaches from where it formed and is stretched even more before evaporating in the late morning. On Earth, orographic clouds are never as big as this Martian cloud, nor as dynamic, making it especially strange.

Now that the researchers have better handle on the life cycle and patterns of this phenomena, it will enable them to more easily target and observe the cloud.

"Many Mars orbiters cannot begin observing this part of the surface until the afternoon due to the properties of their orbits, so this really is the first detailed exploration of this interesting feature — and it's made possible by not only Mars Express' diverse suite of instruments, but also its orbit," study co-author Agustin Sánchez-Lavega, the science lead for the VMC and a professor of physics at the University of the Basque Country, said in the same statement.

This work was first published Dec. 20 in a study in the Journal of Geophysical Research and was released in Volume 126 of Issue 3 in March 2021.

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Lohengrin: Who Was He and What Did He Do?



Lohengrin's Journey
alarie-tano on DeviantArt

The son of Parzival (Percival), Lohengrin is a knight of the Holy Grail sent in a boat pulled by swans to rescue a maiden who can never ask his identity. His story, which first appears in Wolfram von Eschenbach's Parzival, is a version of the Knight of the Swan legend known from a variety of medieval sources. Wolfram's story was expanded in two later romances. Richard Wagner's opera Lohengrin of 1848 is based upon the legend.

In 1848, Richard Wagner, drawing on the contemporary work of Ludwig Lucas, adapted the tale into his popular opera Lohengrin, arguably the work through which Lohengrin's story is best known today. While King Henry the Fowler tries to assemble forces in Brabant to combat the Hungarian invasions, Lohengrin appears on the Scheldt River to defend Princess Elsa from the false accusation of killing her younger brother Gottfried (who turns out to be alive and returns at the end of the opera). According to Wagner,

the Grail imbues the Knight of the Swan with mystical powers that can only be maintained if their nature is kept secret; hence the danger of Elsa's question. The most famous piece from Lohengrin is the "Bridal Chorus" ("Here Comes the Bride"), still played at many Western weddings.

Richard Wagner: Prelude to Lohengrin, Simon Rattle

<https://www.youtube.com/watch?v=zyodILZEFg>

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When Your Car's Name Describes You, Rex Havens



How would you like to be named for one of these beauties?

<https://www.youtube.com/watch?v=ShY-78zI5bk>

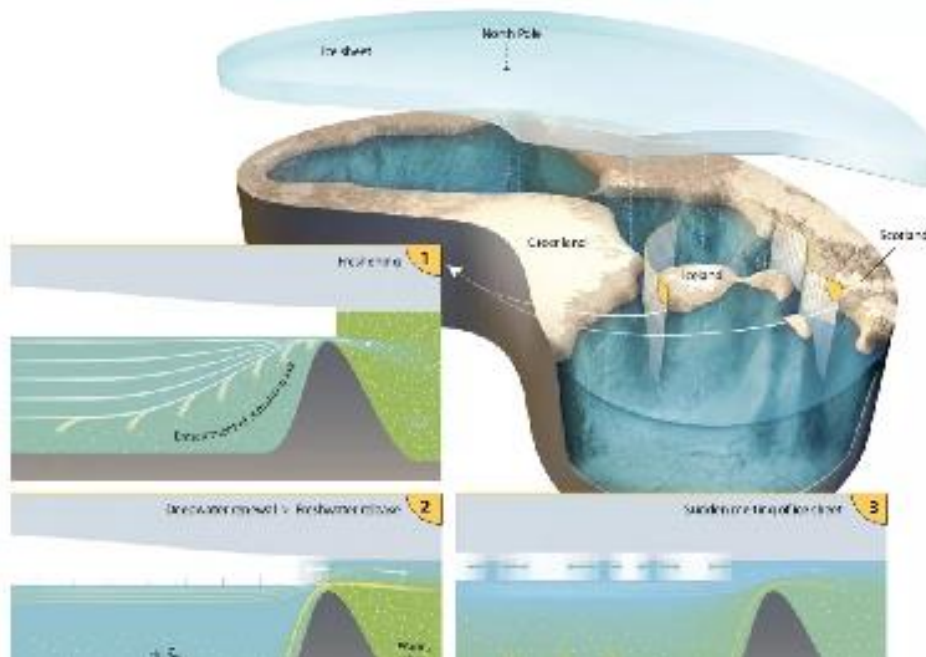
From here to Infinity

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Arctic Ocean Was Once a Tub of Fresh Water Covered with a Half-Mile of Ice

By Stephanie Pappas - Live Science Contributor

At at least two points in history, the Arctic was cut off from other oceans.



When sea levels were low, the Arctic Ocean was cut off from other oceans while still receiving freshwater input from rivers and glaciers.

(Image: © Alfred Wegener Institute/Martin Künsting)

The Arctic Ocean was once a pool of fresh water capped with an ice shelf half as thick as the Grand Canyon is deep.

<https://www.youtube.com/watch?v=OBNwRsrHxA>

If that's hard to envision, don't despair. Scientists were surprised at the discovery, published Wednesday (Feb. 3) in the journal *Nature*, as well. The trick to envisioning this odd arrangement is to think about the relationship between ice sheets and the ocean. When ice sheets melt, they dump water into the ocean, raising the sea level. But when ice sheets grow, as they have during Earth's glacial periods, sea level drops.

Now, new research shows that in these eras of lower sea level, the Arctic Ocean's connection to the Pacific and Atlantic was very limited, with Greenland, Iceland, and northern Europe and Siberia acting as the rim of a bowl containing the Arctic. (Ice itself could have further restricted circulation.) Land and sea alike were overlain with an ice sheet 2,952 feet (900 meters) thick.

Glaciers, river outlets and runoff from the continents kept fresh water flowing into this cordoned-off Arctic Ocean, while saltwater from the Atlantic and Pacific couldn't get in. The exact timing of the freshening process isn't clear, but the researchers calculated that it could have happened in around 8,000 years.

"These results mean a real change to our understanding of the Arctic Ocean in glacial climates," first study author Walter Geibert, a geochemist at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, said in a statement. To our knowledge, this is the first time that a complete freshening of the Arctic Ocean and the Nordic Seas has been considered — happening not just once, but twice."

The missing element

These two periods of a freshwater Arctic occurred from 150,000 to 130,000 years ago and again 70,000 to 60,000 years ago. During these particularly cold times in climate history, an enormous European ice sheet stretched more than 3,100 miles (5,000 km) from Scotland over Scandinavia to the eastern Kara Sea, north of Siberia. Another pair of ice sheets blanketed much of what is now Canada and Alaska, and Greenland was also under an even larger ice sheet than it is today.

Until now, it wasn't clear what the Arctic Ocean looked like at this time, because floating ice sheets leave far fewer geological traces than land-based ice sheets and glaciers. Geibert and his colleagues turned to sediment cores from the Arctic, the Fram Strait between Greenland and the Svalbard archipelago, and the Nordic seas. These long cylinders of sediment hold a stacked history of the conditions under which each layer formed.

Two layers in these cores stood out. Each was missing an isotope, or version of an element, called thorium-230. Thorium-230 forms when naturally occurring uranium decays in saltwater. In marine sediment, the absence of thorium-230 means the absence of saltwater.

"Here, [thorium-230's] repeated and widespread absence is the giveaway that reveals to us what happened," Alfred Wegener Institute micropaleontologist Jutta Wollenburg said in the statement. "According to our knowledge, the only reasonable explanation for this pattern is that the Arctic Ocean was filled with fresh water twice in its younger history — in frozen and liquid form."

A freshwater Arctic

At the time, sea levels were 426 feet (130 m) lower than they are today, and parts of the seafloor topography, such as the shallow parts of the Bering Strait, were above sea level.

When the ice retreated, though, the reversal of the Arctic back to saltwater would have been rapid, Geibert said.

"Once the mechanism of ice barriers failed, heavier saline water could fill the Arctic Ocean again," he said. "We believe that it could then quickly displace the lighter freshwater, resulting in a sudden discharge of the accumulated fresh water ... into the North Atlantic."

It's not clear exactly how quickly the Arctic would have re-salinified, but a similar pulse may have occurred around 13,000 years ago during a cold snap called the Younger Dryas. That event raised sea level 65 feet (20 meters) over 500 years and may have actually caused the cold snap by altering ocean circulation.

This could explain some discrepancies in past estimates of sea level, Geibert said. For example, some studies of coral reef remains suggest that sea levels were higher than studies of Antarctic ice cores indicate. If freshwater wasn't just stored on land, but in an

under-ice reservoir in the Arctic, it could account for some of the gap between the estimates.

Such a freshwater reservoir would have also had its own effects on the environment around it, as may have happened with the Younger Dryas cold period later in history.

"Now, we need to investigate in more detail how these processes were interconnected," Geibert said.

Originally published on Live Science.

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Moon Rising Between Starships



Image Credit & Copyright: John Kraus

What's that on either side of the Moon?

Starships. Specifically, they are launch-and-return reusable rockets being developed by SpaceX to lift cargo and eventually humans from the Earth's surface into space. The two rockets pictured are SN9 (Serial Number 9) and SN10 which were captured near their Boca Chica, Texas launchpad last month posing below January's full Wolf Moon.

The Starships house liquid-methane engines inside rugged stainless-steel shells. SN9 was test-launched earlier this month and did well with the exception of one internal rocket that failed to relight during powered descent. SN10 continues to undergo ground tests and may be test-launched later this month.

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Take That, you Dolt!

These glorious insults are from an era before the English language got boiled down to 4-letter words. They've been in the Ode before (last June) and I would be surprised if we don't see them again in the near future.

A member of Parliament to Disraeli: "Sir, you will either die on the gallows or of some unspeakable disease."

"That depends, Sir," said *Disraeli*, "whether I embrace your policies or your mistress."

"He had delusions of adequacy."

Walter Kerr

"He has all the virtues I dislike and none of the vices I admire."

Winston Churchill

"I have never killed a man, but I have read many obituaries with great pleasure."

Clarence Darrow

"He has never been known to use a word that might send a reader to the dictionary."

William Faulkner (about Ernest Hemingway)

"Thank you for sending me a copy of your book; I'll waste no time reading it."

Moses Hadas

"I didn't attend the funeral, but I sent a nice letter saying I approved of it."

Mark Twain

"He has no enemies but is intensely disliked by his friends."

Oscar Wilde

"I am enclosing two tickets to the first night of my new play; bring a friend, if you have one. "

George Bernard Shaw to Winston Churchill

"Cannot possibly attend first night, will attend second... if there is one."

Winston Churchill, in response

"I feel so miserable without you; it's almost like having you here."
Stephen Bishop

"He is a self-made man and worships his creator."
John Bright

"I've just learned about his illness. Let's hope it's nothing trivial."
Irvin S. Cobb

"He is not only dull himself; he is the cause of dullness in others."
Samuel Johnson

"He is simply a shiver looking for a spine to run up."
Paul Keating

"In order to avoid being called a flirt, she always yielded easily."
Charles, Count Talleyrand

"He loves nature in spite of what it did to him."
Forrest Tucker

"Why do you sit there looking like an envelope without any address on it?"
Mark Twain

"His mother should have thrown him away and kept the stork"
Mae West

"Some cause happiness wherever they go; others, whenever they go."
Oscar Wilde

"He uses statistics as a drunken man uses lamp-posts... for support rather than illumination. "
Andrew Lang (1844-1912)

"He has Van Gogh's ear for music."
Billy Wilder

"I've had a perfectly wonderful evening. But I'm afraid this wasn't it."
Groucho

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Little Chinese Drummer Girl



https://www.youtube.com/watch?v=Yv_drZEa-g

Amazing talent, but thank goodness there's the Wide Pacific to preserve my sanity.

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Sperm whales outwitted 19th-century whalers by sharing evasive tactics

By Ben Turner – Live Science Staff Writer

A study of the whaler's logbooks shows that the marine mammals rapidly learned new ways to avoid their harpoons.



*A pod of sperm whales swims off the coast of the Portuguese island of São Miguel.
(Image credit: Shutterstock)*

Catching a sperm whale during the 19th century was much harder than even Moby Dick showed it to be. That's because sperm whales weren't just capable of learning the best ways to evade the whalers' ships, they could quickly share this information with other whales, too, according to a study of whale-hunting records.

By analyzing newly-digitized logbooks kept by whalers during their hunting voyages in the North Pacific, the researchers found that the strike rates of the hunters upon their targets declined by 58% in just a few years. And it wasn't because the whalers had gotten worse at landing their harpoons — the mammals had learned from their fellow whales' fatal encounters with humans, and they weren't going to repeat them, the researchers explained.

"At first, the whales reacted to the new threat of human hunters in exactly the same way as they would to the killer whale, which was their only predator at this time," study lead author Hal Whitehead, a professor of biology at Dalhousie University in Nova Scotia, told Live Science. "[The sperm whales] all gathered together on the surface, put the baby in the middle, and tried to defend by biting or slapping their tails down. But when it comes to fending off Captain Ahab that's the very worst thing they could do, they made themselves a very large target."

The whales seem to have learned from their mistakes, and the ones that survived quickly adapted — instead of resorting to old tactics, the whalers wrote in their logbooks, the sperm whales instead chose new ones, swimming fast upwind away from the whalers' wind-powered vessels.

It appears these clever tactics developed by individual whales soon spread across the whale community, with whales learning successful getaway techniques from each other, the research team found. Soon, even individuals that had never been attacked before learned to follow the lead of those who had.

The whales communicated with and learned from each other rapidly, and the lessons were soon integrated into their wider culture across the region, according to the researchers' interpretation of the data.



*A painting of British whaling ships hunting sperm whales in the South Seas.
(Image credit: Shutterstock)*

"Each whale group that you meet at sea typically comprises two or three family units, and the units quite often split off and form other groups," Whitehead said. "So, what we think happened is that one or two of the units that make up the group could have had encounters with humans before, and the ones who didn't copied closely from their pals who had."

Sperm whales are excellent intel sharers: Their highly observant, communicative nature, and the fact that each family unit only stays in larger groups for a few days at a time, means they can transmit information fast.

As studies show, that information could be news on new threats, new ways to hunt or new songs to sing.

One example of whales' extraordinary information sharing abilities involves lobtail feeding, in which a humpback whale slaps its tail hard against the water's surface, submerges to blow disorienting bubbles around its prey, and then scoops the prey up in its mouth. Researchers first observed this tactic being used by a single whale in Cape Cod, Massachusetts, in 1980, before it spread throughout the regional population in just 10 years.

Whale culture also extends far deeper than innovative ways to feed. "Sperm whales are divided into acoustic cultural climates," Whitehead said. "They split themselves into large clans, each with distinctive patterns of sonar clicks, like a dialect, and they only form groups with members of the same clan."

Different whale clans each have different ways of singing, moving, hunting and looking after their calves. These differences are profound enough to even give some clans a survival advantage during El Niño events, according to Whitehead.

Survival against impossible odds is a defining feature of the whales' history, and will be even more so as the threats to their existence proliferate. In the 20th century, whales, especially the 13 species belonging to the category of 'great whales' — such as blue whales, sperm whales and humpback whales — found themselves pursued by steamships and grenade harpoons that they could not escape. These whales' numbers

plummeted and they soon faced extinction. Now that commercial whaling is largely illegal, many great whale populations have rebounded, but they still face the growing destabilization of their habitats brought about by industrial fishing, noise pollution and climate change.

Whitehead wants to delve deeper into the ways that different whale cultures are expressed, including the benefits that having one culture over another may help a clan survive.

"Just like humans, you could get whales with a more conservative culture or with a more innovative culture, and we're really interested in finding ways to look at these things," Whitehead said.

The researchers published their findings online on March 17 in the journal *Biology Letters*.

Originally published on Live Science.

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Airborne Aircraft-Carriers?



Aircraft-carriers are juicy targets. They are also increasingly vulnerable ones. Like medieval castles in the age of the cannon, technological advance threatens to make them redundant. Satellites and over-the-horizon radars mean pinpointing their locations is easier. And a single well-aimed, well-armed missile may be enough to render a carrier useless, even if one shot does not sink it outright.

American naval planners are particularly worried about China's df-26. This weapon, which came into service in 2018, is a so-called manoeuvring ballistic missile (meaning it can vary its final approach path, rather than being subject solely to the laws of gravity) that has been dubbed a "carrier killer". The df-26 can be launched from a lorry, and can carry either a conventional or a nuclear warhead.

This threat is fearsome enough to keep American carriers at least 1,600km from China's coast, reckons Bryan Clark, a naval strategist at the Hudson Institute, a think-tank. That is much farther than the range of a carrier's warplanes unless they can be refuelled in-flight. America's Department of Defence is therefore looking for a workaround. One back-to-the-future idea being tested (it dates, originally, from 1917) is to turn a suitable plane into an aerial aircraft-carrier capable of launching and recovering unscrewed drones in flight. This would allow seaborne carriers to be kept well out of harm's way.

Castles in the sky

To that end darpa, the defence department's advanced research projects agency, is running a programme called Gremlins, a name that also applies to the individual drones themselves. A Gremlin drone weighs 680kg and has a wingspan of nearly 3.5 metres. Once it has been dropped, deployed its wings and fired up its turbofan engine, it can fly to an area up to 500km away and in the words of Scott Wierzbanski, the Gremlin programme's head, "go in and create havoc". That done, it would then return to its aerial mothership.

Gremlins would operate in fleets, under ultimate human control. In this, they are similar to the "loyal wingman" idea of drone squadrons accompanying a crewed fighter aircraft into battle. Loyal wingmen, however, would take off from and land on terra firma, or possibly a conventional, naval, aircraft-carrier. Operational Gremlins need never touch the ground.

Gremlins' principal jobs would be intercepting communications, jamming signals and hunting for things to be destroyed, thus softening up the defences in contested airspace to make it safer for crewed aircraft. Such drones could also be armed with small missiles or explosives for a kamikaze attack. And they would both share data and cooperate among themselves, and pass reconnaissance and targeting information back to warships and aircraft able to fire bigger missiles than they could carry.

Gremlin swarms would no doubt suffer losses. But drawing enemy fire would actually be an objective, says Andrew Krepinevich, the boss of a defense consultancy called Solarium, which advises the defence department on aspects of naval and aerial warfare. This way, Gremlins would flush out the position of any hostile missile battery that switched on its targeting radar, marking it for subsequent destruction

In the calculus of combat, sacrificing a drone or two to knock out an enemy air-defense battery makes for a nice swap. Gremlins should therefore be thought of as "tradable" for systems of greater value, says Mr. Wierzbanski. The better to fool the foe, military planners also envisage air-launched drones that mimic the radar and heat

signatures of bigger fighter jets and bombers. This would be done by using shapes and materials that reflect rather than absorbing radar pings, and by leaving an engine's heat signature unmasked. The illusion could be enhanced by flying drones at speeds and in patterns indicative of larger aircraft.

On top of all this, a defender's need to squander precious attention and pricey missiles on incoming cheap drones will give its adversary's more capable aircraft freer rein. Enthusiasts for air-launched drones therefore see value in numbers. Putting lots of blips on radar screens is a good way to fluster an enemy with "complexity and multiple dilemmas", says Tim Keeter, who manages the Gremlins program at Dynetics, DARPA's principal contractor for the project.

To that end, costs must be kept low. The defense department plans to pay less than \$800,000 a pop for Gremlins, though that would be for an order of 1,000 of them. So, if a couple were shot down in an operation, "that's okay, it really doesn't matter," says Mr Wierzbanski. In military jargon, he describes the things as "attritable". Dynetics' working assumption is that each Gremlin will fly a maximum of about 20 missions. This means they can be made from less durable, and therefore cheaper materials and components.

The aerial aircraft-carrier of choice for the Gremlin project is a modified C-130 cargo plane, which could carry up to four of the drones in bomb racks slung under its wings. That would make for a small squadron, but numbers could be bolstered by further drones dropped from accompanying fighters or bombers. Deploying the drones is therefore fairly easy. The tricky part is fishing them out of the air when they return from a mission. For this, Dynetics has designed a special recovery system that fits above a C-130's cargo ramp.

When a Gremlin flies back to the mothership, the cargo ramp opens and the recovery system lowers a boom out of it. This boom releases a pod on a ten-meter-long tether, and that pod clamps onto a short engagement arm which pops out of the top of the Gremlin itself. A successful capture shuts off the Gremlin's engine. A winch then hoists the drone on board. This arrangement should be able to pull eight Gremlins an hour out of the air.

That, at least, is the idea. So far, though Gremlins have managed to come within centimeters of successful capture, such capture has not been achieved. But Dynetics hopes some software tweaks will deal with this by the summer, when operational testing of the Gremlins system by the air force is supposed to begin.

This testing will include flights with various sorts of payloads. But the most important thing to be tested will be how well Gremlins are able to co-operate—for instance, by swapping tasks as circumstances evolve. For this, the air force is developing software that emerged from a different darpa programme, called Collaborative Operations in

Denied Environment.

It will not be able to orchestrate a fully autonomous “swarm”, at least for now. The goal, rather, is to give individual drones enough autonomy for a single human operator to be able to oversee a cluster of them.

The Gremlin-mothership arrangement is distinguished by its scale. But several smaller versions of the underlying idea are also in development. One is being put together by General Atomics, the maker of Predator drones. Predators are showing their age, but General Atomics hopes to breathe new life into them by producing a version that is a mothership for smaller drones called Sparrowhawks that will carry intelligence, surveillance and reconnaissance equipment, electronic-jamming apparatus and possibly explosives. Flight tests began in September 2020, though Sparrowhawks have yet to be air-launched and the firm has not explained how they will be recovered in-flight.

Sparrowhawk’s Ma’am

The American army, for its part, plans to use helicopters fitted with drone-launching pneumatic tubes as motherships. These drones, which, like Gremlins, unfold their wings after launch, have a wingspan of 2.5 metres. In a test conducted last summer six such drones launched in flight were recovered in the air, albeit not by the Black Hawk from which they had emanated. Rather, they were snared by a quadcopter drone dangling a cord that snagged hooks on the target drones’ wings. In May the army plans to use rail catapults to launch bigger drones from helicopters.

As with Gremlins and Sparrowhawks, the army’s push for what it calls “air-launched effects” is driven by America’s shift from counterinsurgency to potential war with a foreign power. Advances in the ability of Chinese and Russian radars to pinpoint troops and aircraft supporting them is a particular concern, says Lieutenant-Colonel Anthony Freude, who is overseeing the technology’s development at the Army Futures Command, in Alabama. This will push army helicopters back from the front line, he says, so they will disgorge numerous drones that will zip ahead instead. They are to hunt for targets, distract the enemy, and serve as an extra communications network. The capability should be operational in less than three years.

Aerial aircraft-carriers of these sorts do have drawbacks. Snatching drones from midair eats up precious time. That and the maneuvering required could make it easier for an enemy to shoot down a mothership. But drones that can be reused 20 times offer advantages, not least of cost, over expendable single-shot alternatives.

Castle builders solved the problems brought by cannons by redesigning fortresses to be low, thick-walled and protected by bastions. That worked well. Whether launching aircraft-carriers into the sky will be an equally successful response to technological advance remains to be seen.

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17th Century Poetry for Today

John Donne (1572-1631)



The English writer and Anglican cleric John Donne is considered now to be the preeminent metaphysical poet of his time. He was born in 1572 to Roman Catholic parents, when practicing that religion was illegal in England. His work is distinguished by its emotional and sonic intensity and its capacity to plumb the paradoxes of faith, human and divine love, and the possibility of salvation. Donne often employs conceits, or extended metaphors, to yoke together "heterogenous ideas," in the words of Samuel Johnson, thus generating the powerful ambiguity for which his work is famous. After a resurgence in his popularity in the early 20th century, Donne's standing as a great English poet, and one of the greatest writers of English prose, is now assured.

Donne's love poetry was written nearly 400 years ago; yet one reason for its appeal is that it speaks to us as directly and urgently as if we overhear a present confidence.

Elegy V: His Picture

Here take my picture; though I bid farewell
Thine, in my heart, where my soul dwells, shall dwell.
'Tis like me now, but I dead, 'twill be more
When we are shadows both, than 'twas before.
When weather-beaten I come back, my hand
Perhaps with rude oars torn, or sun beams tann'd,
My face and breast of haircloth, and my head
With care's rash sudden storms being o'erspread,
My body'a sack of bones, broken within,
And powder's blue stains scatter'd on my skin;
If rival fools tax thee to'have lov'd a man
So foul and coarse as, oh, I may seem then,
This shall say what I was, and thou shalt say,
"Do his hurts reach me? doth my worth decay?
Or do they reach his judging mind, that he
Should now love less, what he did love to see?
That which in him was fair and delicate,
Was but the milk which in love's childish state
Did nurse it; who now is grown strong enough
To feed on that, which to disus'd tastes seems tough."

The Anniversary

All Kings, and all their favourites,
All glory of honours, beauties, wits,
The sun itself, which makes times, as they pass,
Is elder by a year now than it was
When thou and I first one another saw:
All other things to their destruction draw,
Only our love hath no decay;
This no tomorrow hath, nor yesterday,
Running it never runs from us away,
But truly keeps his first, last, everlasting day.

Two graves must hide thine and my corse;
If one might, death were no divorce.
Alas, as well as other Princes, we
(Who Prince enough in one another be)
Must leave at last in death these eyes and ears,

Oft fed with true oaths, and with sweet salt tears;
But souls where nothing dwells but love
(All other thoughts being inmates) then shall prove
This, or a love increased there above,
When bodies to their graves, souls from their graves remove.

And then we shall be thoroughly blessed;
But we no more than all the rest.
Here upon earth we're Kings, and none but we
Can be such Kings, nor of such subjects be;
Who is so safe as we? where none can do
Treason to us, except one of us two.
True and false fears let us refrain,
Let us love nobly, and live, and add again
Years and years unto years, till we attain
To write threescore: this is the second of our reign.

The Dream

Dear love, for nothing less than thee
Would I have broke this happy dream;
It was a theme
For reason, much too strong for fantasy,
Therefore thou wak'd'st me wisely; yet
My dream thou brok'st not, but continued'st it.
Thou art so true that thoughts of thee suffice
To make dreams truths, and fables histories;
Enter these arms, for since thou thought'st it best,
Not to dream all my dream, let's act the rest.

As lightning, or a taper's light,
Thine eyes, and not thy noise wak'd me;
Yet I thought thee
(For thou lovest truth) an angel, at first sight;
But when I saw thou sawest my heart,
And knew'st my thoughts, beyond an angel's art,
When thou knew'st what I dreamt, when thou knew'st when
Excess of joy would wake me, and cam'st then,
I must confess, it could not choose but be
Profane, to think thee any thing but thee.

Coming and staying show'd thee, thee,
But rising makes me doubt, that now
Thou art not thou.

That love is weak where fear's as strong as he;
'Tis not all spirit, pure and brave,
If mixture it of fear, shame, honour have;
Perchance as torches, which must ready be,
Men light and put out, so thou deal'st with me;
Thou can'st to kindle, goest to come; then I
Will dream that hope again, but else would die.

For Whom the Bell Tolls: Read by Richard Mitchley

<https://www.youtube.com/watch?v=Rqvc6UMbx6I>

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Great Escapes: Not Reserved Just for Crooks



<https://www.youtube.com/watch?v=d2jPd-JPg6g>

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Game Changers

Yuri Gagarin, First Man in Space 50 Years Ago this Past Tuesday

But even before the cosmonaut orbited the Earth, rumors abounded that someone else already had.

By David Crookes, for Space Magazine



Yuri Gagarin trains in the Vostok spacecraft in November 1960, five months before his historic

flight.

(Image credit: Getty)

Everybody knows that Neil Armstrong was the first person to set foot on the moon. Most are also aware that he wasn't the first to go into space. After all, Alan Shepard paved the way for American astronauts on May 5, 1961, while Soviet cosmonaut Yuri Gagarin stole a march by rocketing into Earth orbit a few weeks earlier on April 12. Or did he?

Today Gagarin's name is cemented in the record books, and he instantly became a national hero across the Soviet Union. Presented as a triumph of the fiercely fought Space Race against the U.S., the 27 year old, who had been chosen just three days before the mission, spent 108 minutes in space, orbited the Earth and returned fit and well following a drama-filled flight.

And yet, before he even embarked on his journey skywards, doubt was seeded in many a person's mind. For rumors had surfaced that the Soviets had successfully launched a man into space before Gagarin set foot in Vostok 1, and the talk was that one cosmonaut had done so on April 7, just five days earlier.

Dennis Ogden, the Moscow-based correspondent for the British Communist Party newspaper, *Daily Worker*, reported as such, his story splashed across the publication's front page with the headline: "The First Man In Space". It informed readers that the spaceman — "the test-pilot son of a top-ranking aircraft designer" — was "back alive, but suffering from [the] effects of his flight".

A lost cosmonaut conspiracy theory begins

Gagarin's feet hadn't even left the ground when the paper hit the newsstands, and it caused something of a stir, sparking the first whispers of a conspiracy theory which has continued to this day. The Soviet Union denied the reports and instead alerted the press to Gagarin's subsequent feat. Ogden also reported this, his article again making the splash as he wrote of a "hero's welcome" and a Soviet Union "wild with joy at [the] first trip outside this world".

Ogden's article could have been seen as something akin to a correction; confirmation that he was initially wrong about the flight on April 7. But then French journalist Eduard Bobrovsky followed up on Ogden's claims and pointed to the man in question as being an accomplished test pilot called Vladimir Ilyushin, while also stating the flight actually took place on March 25.

Trouble is, this mission had — according to the press sources — not gone quite as well as planned. That is why, it has long since been claimed, Ilyushin's feat was cast aside in favor of Gagarin's successful launch and landing.

Ilyushin was a Soviet general and a test pilot of high standing. He had broken many speed and altitude records and his father was influential, having designed and built Second World War fighters and bombers. Ilyushin senior had also earned himself a place in government. To that end, his son would have been seen as the perfect person

to send into space, his penchant for risk-taking such that the then-34-year-old pilot would have surely relished the task.

And so the story went that his journey outwards on board his spaceship was fine but, after three supposed orbits, Ilyushin's return went awry. Apparently, his landing was off-course, causing him physical harm and mental anguish. There was even a suggestion that the accident had put him into a coma.



*Test pilot Vladimir Ilyushin has been rumored to be the first man in space.
(Image credit: Alamy)*

"The space vessel reportedly was recovered where expected, but Ilyushin was mentally unbalanced and is unconscious in a Moscow hospital," said a report in *The Spokesman Review* about the journalist's claims on April 12, 1961. The article adds that Bobrovsky said his information came from reliable sources that he could not name and that Russian officers denied the report.

The Soviet Union claimed Ilyushin was in hospital being treated for injuries he had received in a car accident. The Soviets were not the only ones blinking with disbelief at this. Even the Americans did not believe the journalists' claims. Indeed, Pierre Salinger, the press secretary to the White House at the time, told reporters that there was no evidence of a flight on April 7 and, we have to assume, nothing to have raised suspicion in March either. North American Aerospace Defense Command (NORAD) space tracking stations, it transpired, had not picked up on anything, and the U.S. was not about to leap in and heap embarrassment on the Soviet Union without proof.

And yet, even this wasn't enough to completely quell suspicion. Some journalists believed the claims of a car crash were a mere cover story, and it certainly wasn't beyond the wildest of imaginations to believe the Soviets would seek to bury a mistake since it had been done so many times in the past.

What's more, in the framework of the Space Race, conspiracists could surmise there was a valid reason for trying to bury such a failure: the Soviets would constantly pull out all the stops to present communism as the superior ideology.

But is that, together with unknown journalistic sources, reason enough to believe that Gagarin's place in history was not quite what it was? Ogden would later claim that he saw a photograph of Ilyushin wearing space gear at the time of the supposed flight, but it has never subsequently surfaced. Meanwhile, Ilyushin himself — who died in 2010, aged 82 — never confessed to having flown into space. He lived to tell the claimed tale, but notably did not.

What has been seen, however, are rumours continuing to swirl long after the event, and they've even been fleshed out. One of the most notable was a 52-minute documentary in 1999 called "The Cosmonaut Cover-Up", released by Global Science Productions and directed by Elliott Haimoff who, in the following year, also helmed "Vladimir Ilyushin: The Real First Man in Space".

Widely broadcast, it claimed Ilyushin had failed to eject from his capsule, crashed in China and, after being captured, was eventually handed back to the U.S.S.R. in 1962. The documentary makers said Ilyushin wouldn't talk about the alleged incidents on camera, according to an article published on Sun Community News, and preferred to maintain his secrecy.

But was Ilyushin so fearful that, in verifying such claims, he would open himself up to a world in which he did not wish to boldly go? Given that the documentary was being made a number of years after the collapse of the Soviet Union, when secrets were finally being divulged and historical events were being flung open, many would suspect not.

All About Space magazine takes you on an awe-inspiring journey through our solar system and beyond, from the amazing technology and spacecraft that enables humanity to venture into orbit, to the complexities of space science.

In fact, the Soviets began to open up well before the U.S.S.R. ceased to be. In 1980 the West finally learned of the death of Valentin Bondarenko, who according to The New York Times, died ten days into a 15-day low-pressure endurance experiment in Moscow in 1961 when fire broke out — even though they had removed his image from an official subsequent training photograph.

It took longer to tell the world of a major launchpad accident that took place on Oct. 24, 1960, and officially killed 78, as eventually revealed to the rest of the world in 1989. There's talk of Gagarin being used for propaganda, but of all the confessions and documents seen since the Soviet Union collapsed, Ilyushin has never featured.

And yet there have been some peculiar pieces of "evidence". Two Italian former amateur radio operators, Achille and Giovanni Judica-Cordiglia, claimed to have recorded audio from an orbiting capsule in the days before Gagarin made his flight, and it was actually the fourth slice of startling audio released by the pair.

The first was from May 1960 of a manned spacecraft reportedly going off-course; the second in November that year of an SOS Morse code from a troubled spacecraft leaving Earth's orbit and, most chillingly, a third in 1961 of a cosmonaut apparently suffocating to death. Should these be hard-and-fast evidence of spaceflights, then we would have to say that not only was Gagarin not the first person into space, Ilyushin was perhaps not first either. But given the supposition was that everyone involved in those three recordings had died, discovering the truth has been even more difficult. And yet theories still mount up.

Who was the first man in space?

What could be made of claims by Mikhail Rudenko, a former Soviet senior engineer and experimenter with Experimental Design Office 456, formed in 1999 by members of the editorial staff of the oldest Soviet paper Pravda, that cosmonauts had been sent into space in 1957, 1958 and 1959?

"All three pilots died during the flights and their names were never officially published," he is quoted as saying in an article published on pravda.ru on April 12, 2001, having explained that the pilots involved were called Ledovskikh, Shaborin and Mitkov and took part in sub-orbital flights. "The cosmonauts were to reach space heights in the highest point of such an orbit and then return to the Earth," he added. But considering Pravda has also run with headlines such as "Aliens forced Americans out from the Moon" and "Alien and human skulls found on Mars", it's a tough call.

Harder still to determine is Ilyushin's location in March and April 1961. The Soviets didn't help themselves in this regard either since they couldn't give a straight answer about the reason why he was seen to be injured — pinned down to that car crash — or when it actually took place. Neither could they offer up a suitable explanation for why he might have been in China. They also went as far as to say he was never actually a cosmonaut and, indeed, it would appear that he wasn't in the original cosmonaut team. No memoirs or declassified information put him there.

Yet it's also difficult to corroborate the Judica-Cordiglia recordings with any data from official sources. Listening stations did not pick up on what they claimed to have committed to tape, and radio astronomer Bernard Lovell, who established the Jodrell Bank Observatory in Cheshire, England, dismissed claims of earlier Russian manned space attempts in 1963.

Even that, however, isn't as clear cut as it sounds. Lovell paid visits to Russia around this time, and there have even been allegations that he was brainwashed. He fell ill that year following such a trip, and the U.K. Ministry of Defence said it might have been due to an attempt to remove his memory of a Soviet offer to build a telescope facility in the U.S.S.R. His son says he was merely ill from exhaustion, according to an article published in February's edition of Physics World magazine. And that sounds more plausible.

Besides, supposing Russia had suffered such terrible space attempts which resulted in deaths and crashes, would it really have announced Gagarin's flight in the way it did?

As James E. Oberg points out in a 1975 article he wrote in Space World magazine, the Russian news agency TASS — frequently used as a front organisation by the Soviet intelligence agency — released its first bulletin while Gagarin was still in-flight. If it was worried about the potential for bad news, wouldn't it have been better to wait until the mission was over and Gagarin's feet were firmly back on the ground, rather than risk Gagarin's spacecraft hitting the same problems as the one claimed to have taken place just days before?

Maybe we will never know. The two men who would have been directly involved are no longer alive — Gagarin was killed when the MiG-15 training jet he was piloting crashed on March 27, 1968, when he was 34. Given the evidence that has been made available, the smart money remains on Gagarin having been the first person on a manned spaceflight Russian space history can be murky and difficult to pick apart, but in truth there is no real reason to lie in instances such as this.



Valentina Tereskova; First woman in space
imdb.com

[I'm going to end forever the discussion. Yuri Gagarin was the first man and Valentina Tereshkova, the first woman. Congratulations to them both.]

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