

Ode to E Pluribus Unum for Sunday May 7 2023

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The Medulla Nebula Supernova Remnant



Image Credit & Copyright: Kimberly Sibbald

What powers this unusual nebula? CTB-1 is the expanding gas shell that was left when a massive star toward the constellation of Cassiopeia exploded about 10,000 years ago. The star likely detonated when it ran out of elements near its core that could create stabilizing pressure with nuclear fusion.

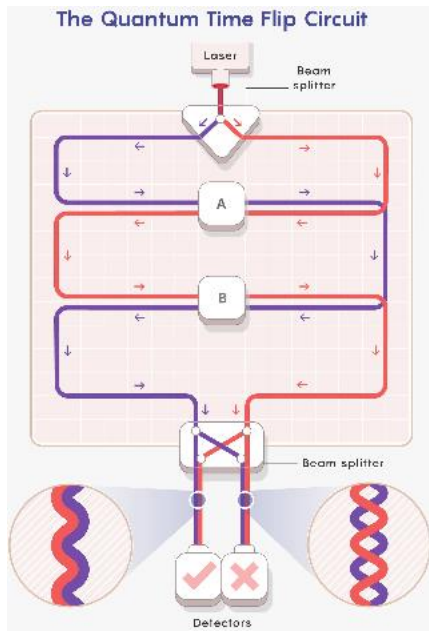
The resulting supernova remnant, nicknamed the Medulla Nebula for its brain-like shape, still glows in visible light by the heat generated by its collision with confining interstellar gas. Why the nebula also glows in X-ray light, though, remains a mystery.

One hypothesis holds that an energetic pulsar was co-created that powers the nebula with a fast outwardly moving wind. Following this lead, a pulsar has recently been found in radio waves that appears to have been expelled by the supernova explosion at over 1000 kilometers per second.

Although the Medulla Nebula appears as large as a full moon, it is so faint that it took many hours of exposure with a telescope in Seven Persons, Alberta, Canada to create the featured image.

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How Quantum Physicists ‘Flipped Time’ (and Didn’t)



<http://bit.ly/3JBHVnU>

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How Do I Dance Wildly Now?



I rail against the calm
that keeps me from
ferocious fire.
How do I dance wildly now
as years like logs
grow higher?
What is pushing from within
a spider's legs
well spread,
expanding for a sprint
a jump
across the unmade bed?
I only have a hint so far
of light and lust inspired,
lust, that word, for stacking up
gathered logs yet higher.
Even if, in the end, I end
a peat bog being,
that is not the issue here,
I sense it's more a keening
something craves this burst
a thrust
I cannot now define.
Others known as ancients
can say yes, that spear of rhyme,
disease within one's long lived years
aches to spin free fears.
You want to hold the sun
breast close
to burn away the tears.

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The Medieval Hereford Map Stretched Beyond Earth to Heaven



Thought to have been created around 1300 CE, the Hereford Mappa Mundi is the largest surviving complete map of the medieval world. Named for Hereford Cathedral where the map is housed today, the extraordinary document offers insight into the minds of Christian Europeans in the Middle Ages, revealing the extent to which their understanding of the world was shaped by stories from the Bible and the Classics. In this video essay, the US graphic designer and video producer Jeremy Shuback explores the map's structure and the breadth of its illustrations, detailing how this imaginative piece of medieval cartography binds history, geography, mythology and religion to form an invaluable sketch of the Middle Ages.

<http://bit.ly/42wvnGU>

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'Fairy Lantern' Plant, Presumed Extinct, Found in Japan

The mysterious plant, *Thismia kobensis*, was rediscovered growing a few inches from a forest floor in Japan.



The rediscovered Thismia kobensis plant with its waxy, translucent flower erupting from the forest floor.

(Image credit: Kenji Suetsugu.)

Scientists in Japan have rediscovered an extremely rare species of parasitic "fairy lantern" that was presumed to be extinct.

The mysterious plant, *Thismia kobensis*, belongs to a rarely seen, fungus-sapping genus. The plants grow underground without photosynthesis yet send translucent flowers to sprout like ghostly lanterns from the forest floor.

First documented in 1992 in Kobe, Japan, the plant was presumed extinct when its habitat was destroyed by the building of an industrial complex. Now, three decades later, on a forest trail about 19 miles (30 kilometers) from Kobe, scientists have found the waxy, fang-shaped petals of the rare plant once more. They described the discovery Feb. 27 in the journal *Phytotaxa* .

"This unexpected find and subsequent investigations have shed new light on this remarkable genus and its evolutionary history," the researchers wrote in a statement .

Fairy lanterns (*Thismia*) are ethereal, subterranean plants whose only brief eruptions from the earth come in the form of intricately petaled flowers. Without chlorophyll to photosynthesize energy, the plants instead use a process called mycoheterotrophy to steal the nutrients from the fungi that entwine themselves around their roots.

Thismia's preferred habitats, which tend to be tropical rainforests, are facing global decline. Little is known about the elusive plants, and a significant number of the roughly 90 identified species have been lost, some for decades, after their initial discoveries.

"Because most mycoheterotrophic plants obtain their carbon indirectly from photosynthetic plants via shared mycorrhizal [fungal and plant] networks, they are highly dependent on the activities of both the fungi and trees that sustain them," the

researchers wrote in the study. "Consequently, they are particularly sensitive to environmental disturbances, often rendering them both rare and endangered."

The rediscovery of *T. kobensis* makes it the northernmost known Asian fairy lantern species. After studying the otherworldly plant, the scientists found that its features, such as its distinct petals and lack of nectar glands, make it closely related to the only North American fairy lantern, *Thismia americana*.

The researchers think *T. kobensis* is a descendent of *T. americana*, which might have crossed from North America to East Asia over the Bering Land Bridge. *T. americana* was first found in Chicago in 1912 but has not been seen since 1916.

By Ben Turner for Live Science

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This Week's Aaron Copeland



I've worried myself sick selecting the 20th Century's American composer who best showed what our nation was about, and finally returned to the where my search began...Aaron Copeland.

For the next several weeks I will show you the basis of my decision.

For this week's example I've chosen his Appalachian Spring Suite. It's long but satisfying in every respect, leading you through the majesty and

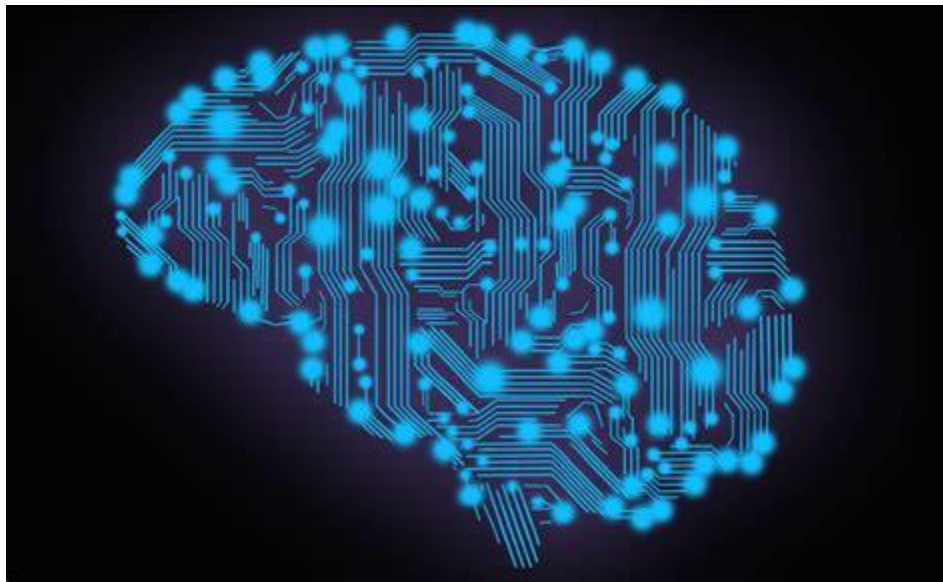
harmony found only in nature. I can listen to it anytime, but just before bedtime is when I can give it my full attention.

Appalachian Spring Suite <https://www.youtube.com/watch?v=-LGjLBzAhKw&pp=ygUNYWFyb24gY29wbGFuZA%3D%3D>

I look forward to your suggestions for which of Copeland's works to play in succeeding weeks.

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Measuring Trends in Artificial Intelligence



The AI Index is an independent initiative at the Stanford Institute for Human-Centered Artificial Intelligence (HAI), led by the AI Index Steering Committee, an interdisciplinary group of experts from across academia and industry. The annual report tracks, collates, distills, and visualizes data relating to artificial intelligence, enabling decision-makers to take meaningful action to advance AI responsibly and ethically with humans in mind.

<http://bit.ly/3MBosqB>

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Parking Lots Across the U.S. Are Being Turned into Housing



San Francisco: Mason on Mariposa
[Photo: Olivier Koning/courtesy WCIT Architecture]

Right now, there are probably between 700 million and 2 billion parking places in the U.S. But the sea of American parking lots is slowly shrinking.

<https://bit.ly/41eq9hx>

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Taking a Lesson in Evolutionary Adaptation From Octopus, Squid.



Photo by Anik Gearson

Two new studies describe path of divergent sensing capabilities, tracking lineage from common ancestral neurons

<https://bit.ly/3KJ003Y>

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'Short-Term Memory Illusions' Can Warp Human Recollections Just Seconds After Events.

A new study suggests that people can misremember events mere seconds, or even fractions of a second after they happen.



*People's short-term memories sometimes "warp" only seconds after the event they're based on.
(Image credit: agsandrew via Shutterstock)*

Human beings can generate false memories of events mere seconds after they have occurred, a new study has found.

The phenomenon, which researchers have dubbed "short-term memory illusions," shows how easily and rapidly humans reimagine experiences to fit our preconceptions, rather than accurately recording what takes place. The researchers published their findings April 5 in the journal [PLOS One](#).

"It seems that short-term memory is not always an accurate representation of what was just perceived," the researchers wrote in the study. "Instead, memory is shaped by what we expected to see, right from the formation of the first memory trace."

To test the accuracy of short-term memories, the researchers enlisted 534 volunteers to take part in a series of four experiments, each designed around memorizing a sequence of letters of the Latin alphabet.

In each round, participants were shown a collection of letters, arranged in a circle. Those letters would then disappear and a box would pop up at a specific position in the circle, to indicate which letter they should remember. Participants had to remember both the letter's identity and the direction it was facing, as some had been mirrored to face backwards.

Sometimes, participants were shown a second, irrelevant batch of letters before their memory was tested. After giving the answer, they were then asked to score their confidence, from very low to very high, that they had guessed correctly.

When the participants were asked to recall what they saw just a half second later, they were wrong just under 20% of the time, and this error rate shot up to 30% when asked three seconds later. When asked to recall whether a letter was facing forwards or

backwards, participants who responded with high confidence had flipped the letter to its regular position 37% of the time, even though they had been explicitly warned that mirrored letters would appear in the tests and should not be mistakenly reported for real ones.

To confirm their findings, the researchers repeated the tests across three similar experiments with a cohort of 348 people not included in the original analysis, who showed the same tendency to mentally flip the mirrored letters. Across all experiments, this mental letter-flipping was the most common high-confidence error — a sign that human brains record experience based on preset notions (in this case, how a letter should appear) that enable us to generate better predictions about the world, while pruning out peculiarities that don't fit with those preconceptions.

"These memory illusions seem to be the result of world knowledge and not of visual similarities," the researchers wrote in the study. "Taken together, the results thus show that world knowledge can shape memory even when memories have only just been formed."

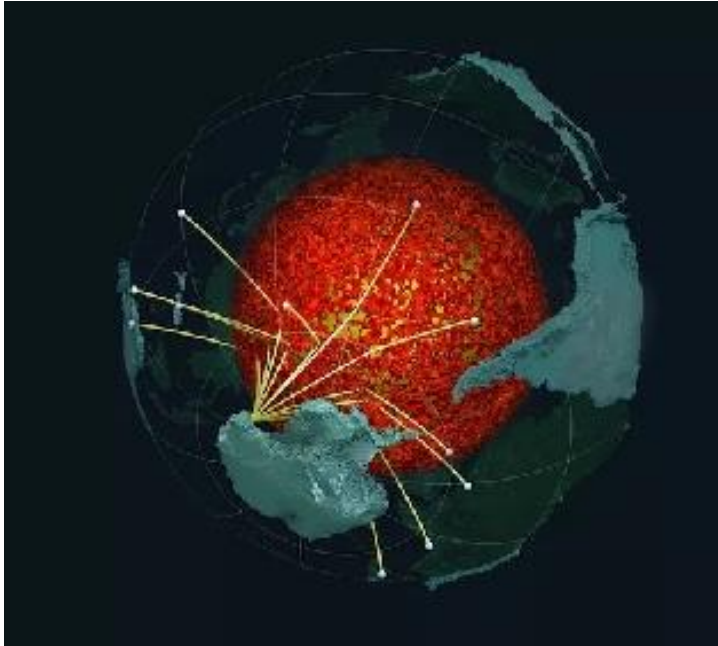
The researchers' next steps are to design experiments that could demonstrate similar short-term memory adjustments in real-world settings, as well as for other types of memory besides those related to visual and language-related stimuli.

By Ben Turner for Live Science

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Ancient Ocean Floor Surrounds Earth's Core,

Seismic Imaging Reveals an ancient ocean floor between Earth's core and mantle.



An illustration of underground imaging created by seismic waves in the Earth's Southern Hemisphere.

(Image credit: Figure courtesy of Edward Garnero and Mingming Li at Arizona State University)

A massive ocean floor lurks near Earth's core. Now, seismic imaging has revealed that it likely surrounds much — if not all — of the core.

This thin, dense layer is lodged roughly 2,000 miles (3,200 kilometers) below Earth's surface, between the core and the planet's middle layer, called the mantle. And it might encompass the entire core-mantle boundary, according to a study published April 5 in the journal [Science Advances](#).

To study Earth's interior, seismologists measure earthquake waves that zoom through the planet and then back out to Earth's surface. By seeing how these waves change after passing through the different structures inside Earth, researchers can create a map of what Earth's innards look like. Past research identified a handful of isolated pockets of dense ocean crust near the core. These pockets are called ultra-low-velocity-zone structures (ULVZs) because seismic waves travel very slowly through them.

"Only [approximately] 20% of the core-mantle boundary has been previously investigated for ULVZs, which have not been identified in all of these locations," lead study author Samantha Hansen (opens in new tab), an associate professor of geological sciences at The University of Alabama, told Live Science in an email. "It is possible that this anomalous material covers the entire core."

In the new study, scientists placed seismic equipment at 15 stations located across Antarctica and collected data for three years.

This study marks the first time that high-resolution imaging of the core-mantle boundary was made using data from the Southern Hemisphere. The layer itself is razor-thin compared with the core, which is 450 miles (724 km) across, and the mantle, which is roughly 1,800 miles (2,900 km) thick.

"The thickness does vary, depending on location," Hansen said, with some spots measuring about 3.1 miles (5 km) thick and others 31 miles (50 km) in thickness.

This ancient ocean layer likely developed when Earth's tectonic plates shifted, causing oceanic material to be carried into the planet's interior at subduction zones, the areas where two plates collide and force one to dip beneath the other. Over time, "accumulations of subducted oceanic material collect along the core-mantle boundary and are pushed by the slowly flowing rock in the mantle," according to a [statement](#).

Researchers think the newly detected ULVZs are essentially "underground mountains" that allow heat to escape from Earth's molten core, according to the statement.

"The presence of this layer could buffer heat flow across the core-mantle boundary, which is important because the temperature conditions in this portion of the Earth have been shown to strongly impact the planet's magnetic field," Hansen said.

Chunks of this hidden ocean floor may also get swept up into mantle plumes — hot, upwelling jets of molten rock that fuel volcanic hotspots at the surface, such as in Hawaii, Hansen suggested.

"Further, since mantle plumes are largely controlled by the thermal conditions near the core-mantle boundary, the temperature influence of ULVZs may help dictate where plumes form," Hansen said.

The research team plans to expand their study by examining data collected from all available seismic stations in Antarctica.

Jennifer Nalewicki for LiveScience

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Mach 3 Man Who Test Flew the Sr-71 Blackbird

Lockheed's chief test pilot for the SR-71 Blackbird, Robert J. Gilliland, overcame numerous inflight emergencies during his career and never failed to bring an airplane back to earth.



*Gilliland peers from the cockpit of an SR-71 after a test flight in the Blackbird.
(Courtesy Robert J. Gilliland/Robert J. Gilliland Jr.)*

<https://bit.ly/3UGCyJc>

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Coming Airworthiness Directive Will Ground All Airworthy B-17s



Photo: Yankee Air Museum

Last Saturday (April 15), the Yankee Air Museum announced it was grounding its World War II-vintage Boeing B-17G “Yankee Lady” in anticipation of an FAA Airworthiness Directive (AD), expected within a few weeks. Online sources, including a detailed article at Aerovintage.com, anticipate the AD will likely ground all currently flying B-17s due to “wing spar issues” cited by the Yankee Air Museum.

The Michigan-based museum posted on its Facebook page: “Hello, The Yankee Air Museum decided to proactively cease flight operations of the B-17G Flying Fortress ‘Yankee Lady.’ Recent inspections of other B-17s have discovered wing spar issues. As a

result, we expect a mandatory Airworthiness Directive to be issued by the FAA in the next few weeks regarding the matter. Out of an abundance of caution, we are temporarily ceasing our B-17 flight operations and awaiting direction from the FAA regarding necessary inspections and repairs that will be required. It is expected that the B-17 will not fly during the 2023 flying season. Please note that this only affects the B-17."

The announcement added that those who had scheduled "Air Adventure" rides on "Yankee Lady" would receive refunds and assured that its B-25, C-47, and Bell UH1 "Huey" helicopter will continue to fly with passengers. A 25-minute ride on the B-17 is priced at \$525 (\$425 for museum members) according to the museum's website.

"Yankee Lady" is one of the few B-17s currently operating in the U.S. Others include the Commemorative Air Force's "Sentimental Journey" and the Erickson Aircraft Collection's "Olde Pub." According to Wikipedia and other sources, there are currently nine airworthy B-17s worldwide out of 12,731 manufactured by Boeing, Douglas and Lockheed between 1936 and the end of World War II in 1945.

The Experimental Aircraft Association's B-17 "Aluminum Overcast" has remained grounded since April 2021 over issues with its wing spars, and it is thought that the upcoming AD results at least in part from what has been uncovered in efforts to address those issues.

By Mark Phelps -for AVweb

End of an era? Perhaps, but the rumble of those four Wright 1820s will live on.

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The Right Stuff: In Memory of Chuck Yeager



Here's his flight in the NF-104a that almost ended in disaster. This film has been made by Paul Ferre using in-game footage from DCS WORLD by Eagle Dynamics. Original soundtrack, sound and visual effects have been added for historical accuracy and dramatic purposes.

<https://youtu.be/PQidYOXGoRY>

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F-104 Climbing Vertically Over NASA Shuttle Landing Facility



The "missile with a man in it" once again displays the raw power of its engine, rocketing effortlessly across the sky.

YouTube video by Piercarlo Ciacch

<https://youtu.be/Oax-YsLh6CE>

Beautiful bird doing as Kelly Johnson intended. Thanks to The Aviationist for this.

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Starship Mission to Mars: How it Might Work



humanmars.net

<https://youtu.be/921VbEMAwY?t=3>

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What The Earth Looked Like Millions of Years Ago



Interactive depictions of Earth's past

The Earth is more than four billion years old, with its features changing as its tectonic plates slowly shifted over time. This interactive display lets you travel back as far as 750 million years ago, to not only see what Earth looked like, but where your home address was.

<https://dinosaurpictures.org/ancient-earth#240>

You're going to want to play with this for a while.

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The Coronation Crown in 3-D

The dazzling crown that will make a king



<https://bit.ly/42bIhtz>

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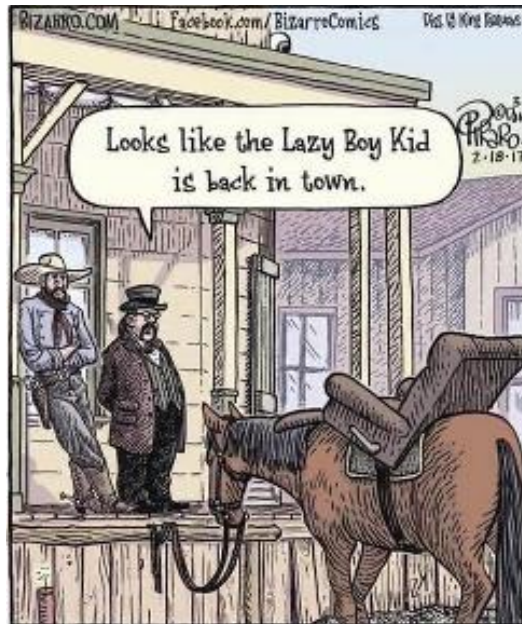
Portraits of Native American Tribes



*Matika's mother, Nancy, and daughter, Alma Bee.
Credit: Matika Wilbur*

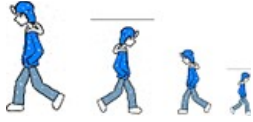
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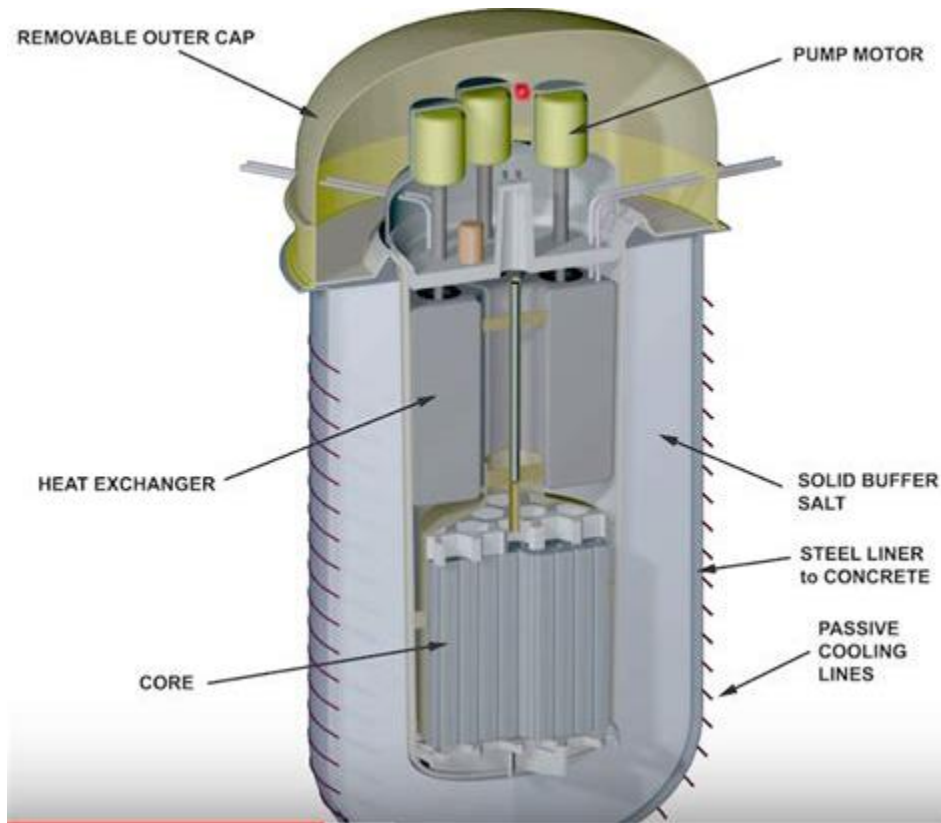
My Walking Thoughts



For Sunday May 7 2023

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What Is a Thorium Reactor?



Thorium is an abundant, lightly radioactive metal—named by its Swedish discoverer after the Norse god, Thor—that can be used in certain types of nuclear reactors. It isn't really fuel, because it can't be split like uranium can. But when thorium is placed in a reactor, it absorbs some of the neutrons that are given off by fission. A thorium atom that picks up a neutron becomes a new element—uranium 233, which is a reactor fuel. So, a reactor can cook thorium into reactor fuel, and then consume the fuel to make electricity.

Thorium is about three times more abundant than uranium. It's already produced by mining companies as a byproduct, and it has a variety of non-nuclear uses. Plus, used

fuel from thorium reactors contains minimal amounts of very long-lived radioactive materials compared to current uranium fuel, so disposing of waste is easier.

There are no thorium reactors running today, but Flibe Energy Inc., a startup based in Huntsville, Alabama, has an advanced reactor design that uses thorium and molten salt. Employing molten salt in place of water (to transfer heat from the fuel) allows a reactor to operate at a higher temperature and at lower pressure, which means it doesn't need a super-strong and expensive reactor vessel and piping.

Heat from a high-temperature thorium reactor—whether molten salt or other—could be used in a variety of applications to displace fossil fuels, such as producing hydrogen for transportation or industrial use. Like all reactors, a thorium reactor would be carbon-free. And it would be dispatchable, meaning that it would run when needed and not simply when weather conditions permitted.

Thanks to work done in the U.S. national laboratories in the 1960s, the molten salt that Flibe proposes for a thorium reactor is already familiar to engineers. Still, deploying thorium reactors will require additional research and development, which is why Yang has proposed \$50 billion dollars for thorium research (along with fusion).

Advanced nuclear technologies, including thorium reactors, are a promising component of a future with reduced carbon emissions and a stable climate.

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What Else is there to Know

When we finally decide to take control of our water resources, nothing other than a lot of pontificating will happen until we dedicate the huge amounts of energy required to handle its transport, treatment, and distribution. While this has been known for decades (maybe millennia) politicians have shrunk before the enormity of the situation because no good will befall them until long after they're gone from the scene and other psychopaths yet to be born take credit for the effort.

Indeed, if we don't choose to meet the water challenge now it really won't matter how much carbon we loft into the atmosphere, so maybe it's time to shoot to kill two birds at the same time.

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One of the key design features of a thorium reactor is that it uses a liquid fuel, typically a molten salt mixture, instead of solid fuel rods. This allows for greater control over the reaction process, as the fuel can be circulated and adjusted in real-time to regulate the rate of fission.

In addition to the liquid fuel, thorium reactors also typically use control rods made of materials such as boron or cadmium to absorb neutrons and regulate the reaction process. These control rods can be inserted or withdrawn as needed to adjust the rate of fission.

Finally, thorium reactors also use monitoring and feedback systems to continuously measure the reaction rate and adjust the control rods and fuel flow accordingly. This allows for precise control over the reaction process and ensures that the reactor operates safely and efficiently.