

Welcome to the November 8th, 2017, Edition of THE REVENGE HUMP DAY!

Halloween was a big let down for me because we only had one trick-or-treater come by the house. And that little demon was Tristan, Bubba Bear, who was brought over by his daddy. Don't get me wrong, he looked outstanding in his Minion's costume and he is a joy. But I was expecting more. Oh well, maybe next year.

I have been enjoying the second season of the Shannara Chronicles on Spike TV for the past few weeks. I have never been a great fan of the written works of Fantasy Fiction except for Tolkien or Eddings. Am more into Hard Science Fiction. But, the Shanarra was filmed in New Zealand and that is a country of fantastic scenery. Occasionally I can even recognize a place I have been to on my past ramblings. Also, I was very fortunate to meet Terry Brooks, the writer of the Shanarra series and he is a great guy.

I have also been enjoy all of the Super Hero shows on the CW. I guess I'll have to admit that I love escapist shows. Supergirl reminds me of when I was a kid reading comic books. The Flash is the same for me. I guess I refuse to grow up, only get older.

I have been enjoying Lucifer this year. It is definitely a different take on the mystical that I grew up with. I will admit that on Tuesday's, SWMBO and I watch NCIS, Bull and NCIS New Orleans together. It is our can't miss time together. As for the rest of it, it's just TV to me.

And yes, I still am not watch Pro Football. It is my belief that the player's protests have gone too far for me and now they are just disrespecting the fans. The ratings are plunging and the fans are staying away in droves. What ye sowed ye shall reap.

So on that "thoughtful note", why don't y'all sit back and relax because here's the best in gossip, jokes and science for your reading pleasure!

Uncle Timmy

<G>~<O>~<S>~<S>~<I>~<P>~<S>~<T>~<A>~<R>~<T>~<S>~<H>~<E>~<R>~<E>~<I>

[LIBERTYCON](#) FACEBOOK POSTING

November 7, 2017

Thank you all for being patient with [LibertyCon](#) regarding LC31 in 2018. We have the best con family ever!

We have just a very few more details that need to be addressed before a complete formal announcement can be made which will include a registration page and a hotel link to make reservations.

MARK YOUR CALENDARS:

LIBERTYCON 31 WILL BE HAPPENING:
June 29 - July 1, 2018 in Chattanooga, TN!

Keep in mind, due to our charter and 501c3 status, we are limited to a membership of only 750. This includes Board of Directors, Staff, Attending Pros, and Attendees. Unlike other cons, at LibertyCon everyone pays the same rate and all proceeds are donated to charity.

Please note: we have sold out of our memberships via pre-reg over the last few years.

A FULL FORMAL ANNOUNCEMENT should be happening by the end of the week. We will be paying to boost the Facebook post so as many folks who follow this page will see the post on their feed. Feel free to share it, via Facebook, email, Twitter, or word of mouth, as soon as you see it to help ensure as many of the LibertyCon Family see it as well.

After over 15 months of negotiations with hotels, we finally did it!

<T>~<H>~<E>~<J>~<O>~<K>~<E>~<S>~<S>~<T>~<A>~<R>~<T>~<H>~<E>~<R>~<E>

From: "Mike Waldrip" waldripk@gmail.com

GLOBALIZATION?

This is probably the easiest rational explanation for Globalisation:

A definition of globalisation that I can understand and to which I now can relate:

Question:

What is the truest definition of Globalization?

Answer:

Princess Diana's death.

Question:

How come?

Answer:

An English princess with an Egyptian boyfriend crashes in a French tunnel, riding in a German car with a Dutch engine, driven by a Belgian who was drunk on Scottish whisky, (check the bottle before you change the spelling), followed closely by Italian Paparazzi, on Japanese motorcycles, treated by an American doctor, using Brazilian medicines.

This is sent to you by a Canadian, using American Bill Gates' technology, and you're probably reading this on your computer, that uses Taiwanese chips, and a Korean monitor, assembled by Bangladeshi workers in a Singapore plant, transported by Indian truck drivers, hijacked by Indonesians, unloaded by Sicilian longshoremen, and trucked to you by Mexican illegals.....

That, my friends, is Globalization!

<J>~<O>~<K>~<E>~<S>

IN THE RAIN

A woman from Vancouver was having a daytime affair while her husband was at work. One rainy day she was in bed with her boyfriend when, to her horror, she heard her husband's car pull into the driveway. "Good grief - hurry and grab your clothes, and jump out the window. My husband's home early." "I can't jump out the window. It's raining like crazy out there." "If my husband catches us in here, he'll kill us both!" she replied, "He's got a hot temper and a gun, so the rain is the least of your problems."

So the boyfriend scoots out of bed, grabs his clothes and jumps out the window. As he ran down the street in the pouring rain, he quickly discovered he had run right into the middle of the annual Vancouver marathon, so he started running along beside the others, about 1,200 of them. Being naked, with his clothes tucked under his arm, he tried to blend in as best he could.

After a little while a small group of runners who had been watching him with some curiosity, jogged closer. "Do you always run in the nude?" one asked.

"Oh, yes!" he replied, gasping for air. "It feels so wonderfully free and exhilarating!"

Another runner moved along side. "Do you always run carrying your clothes with you under your arm?"

"Oh, yes." he answered breathlessly. "That way I can get dressed right at the end of the run and get in my car to go home."

Then a third runner cast his eyes a little lower and asked, "Do you always wear a condom when you run?"

"Nope -- just when it's raining!"

<J>~<O>~<K>~<E>~<S>

RANDOM THOUGHTS

Lying around, pondering the problems of the world, I realized that at my age I don't really give a tinker's dam anymore.

A whale swims all day, only eats fish, drinks water, but is still fat..

A rabbit runs and hops and only lives 15 years, while a tortoise doesn't run and does mostly nothing, yet it lives for 150 years. And they tell us to exercise? I don't think so.

Now that I'm older, here's what I've discovered:

- 1.. I started out with nothing, and I still have most of it.
2. My wild oats are mostly enjoyed with prunes and all-bran.
3. If walking is good for your health, the postman would be immortal.
4. Funny, I don't remember being absent-minded.
5. Funny, I don't remember being absent-minded.

6. If all is not lost, then where the heck is it?
7. It was a whole lot easier to get older than it was to get wiser.
8. Some days, you're the top dog, some days you're the hydrant.
9. I wish the buck really did stop here, I sure could use a few of them.
10. Kids in the back seat cause accidents.
11. Accidents in the back seat cause kids.
12. It's hard to make a comeback when you haven't been anywhere.
13. The world only beats a path to your door when you're in the bathroom.
14. If God wanted me to touch my toes, he'd have put them on my knees.
15. When I'm finally holding all the right cards, everyone wants to play chess.
16. It's not hard to meet expenses . . . They're everywhere.
17. The only difference between a rut and a grave is the depth.
18. These days, I spend a lot of time thinking about the hereafter . . . I go somewhere to get something, and then wonder what I'm "here after".
19. Funny, I don't remember being absent-minded.
20. It is a lot better to be seen than viewed.
21. Have I sent this message to you before...or did I get it from you?

<J>~<O>~<K>~<E>~<S>



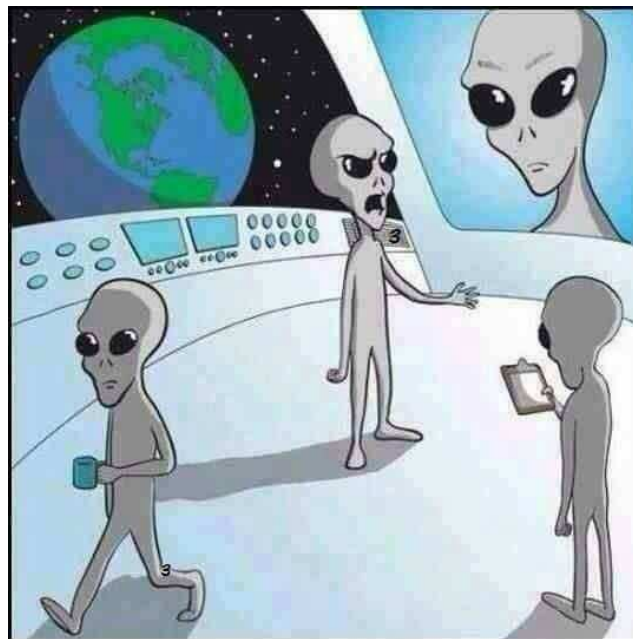
<J>~<O>~<K>~<E>~<S>

You Only Had One Job To Do



<J>~<O>~<K>~<E>~<S>

How Other See Us



**"LAST MONTH THEY WERE LOBOTOMIZING PUMPKINS,
NOW THEY'RE SHOVING BREAD UP A TURKEY'S ASS. THIS
PLANET HAS ISSUES, BERT."**

The Best Irish Joke Ever. This Is Gold.

Two men were sitting next to each other at Murphy's Pub in London. After awhile, one bloke looks at the other and says, 'I can't help but think, from listening to you, that you're from Ireland'

The other bloke responds proudly, 'Yes, that I am!'

The first one says, 'So am I! And where about from Ireland might you be?'

The other bloke answers, 'I'm from Dublin, I am.'

The first one responds, 'So am I!'

'Mother Mary and begora. And what street did you live on in Dublin?'

The other bloke says, 'A lovely little area it was. I lived on McCleary Street in the old central part of town.'

The first one says, 'Faith and it's a small world. So did I! So did I! And to what school would you have been going?'

The other bloke answers, 'Well now, I went to St. Mary's, of course.'

The first one gets really excited and says, 'And so did I. Tell me, what year did you graduate?'

The other bloke answers, 'Well, now, let's see. I graduated in 1964.'

The first one exclaims, 'The Good Lord must be smiling down upon us! I can hardly believe our good luck at winding up in the same place tonight. Can you believe it, I graduated from St. Mary's in 1964 my own self!'

About this time, Vicky walks up to the bar, sits down and orders a drink.

Brian, the barman, walks over to Vicky, shaking his head and mutters, 'It's going to be a long night tonight.'

Vicky asks, 'Why do you say that, Brian?'

'The Murphy twins are drunk again.'

via.LoveThisPic.com

<J>~<O>~<K>~<E>~<S>

The Bear - Film by Jean-Jacques Annaud

<http://www.flixxy.com/bear-animal-nature-film.htm>

Sometimes less says more: a growl or a snarl can be worth a thousand words. Without any verbal dialogue, the raw emotions of the wilderness are vivid in this segment of *The Bear*, a film about the actions of animals in relation to humans. In this suspenseful part of the story, a cub is hunted by a mountain lion who shows no mercy. Without any verbal dialogue, the raw emotions of the wilderness shine through.

<J>~<O>~<K>~<E>~<S>~<of>~<the>~<W>~<E>~<E>~<K>

From: Jerry Tollett

We all need a good laugh every now and then...

YIDDISH HUMOUR...

Jewish Comedians. Some of us miss the old kind of (Yiddish) humor. Not a single swear word in their comic routines as shown below:

**A car hit an elderly Jewish man. The paramedic says, "Are you comfortable?"
The man says, "I make a good living."**

~~~~~

**I just got back from a pleasure trip. I took my mother-in-law to the airport..**

~~~~~

I've been in love with the same woman for 49 years. If my wife finds out, she'll kill me!

~~~~~

**Someone stole all my credit cards, but I won't be reporting it. The thief spends less than my wife did. We always hold hands. If I let go, she shops.**

~~~~~

My wife and I went to a hotel where we got a

waterbed. My wife calls it the Dead Sea ..

~~~~~

My wife and I revisited the hotel where we spent our wedding night. This time I was the one who stayed in the bathroom and cried.

~~~~~

My wife was at the beauty shop for two hours. That was only for the estimate.. She got a mudpack and looked great for two days. Then the mud fell off.

~~~~~

The Doctor gave a man six months to live. The man couldn't pay his bill, so the doctor gave him another six months.

~~~~~

The Doctor called Mrs. Cohen saying, "Mrs. Cohen, your check came back."
Mrs. Cohen replied, "So did my arthritis!"

~~~~~

Doctor: "You'll live to be 60!" Patient: "I AM 60!" Doctor:  
"See! What did I tell you?"

~~~~~

A doctor held a stethoscope up to a man's chest.. The man asks, "Doc, how do I stand?
The doctor says, "That's what puzzles me!"

~~~~~

Patient: "I have a ringing in my ears. " Doctor: "Don't answer!"

~~~~~

A drunk was in front of a judge. The judge says, "You've been brought here for drinking.
The drunk says, "Okay, let's get started."

~~~~~

A man called his mother in Florida . "Mom, how are you?"  
"Not too good," said the mother. "I've been very weak."  
The son said, "Why are you so weak?"  
She said, "Because I haven't eaten in 38 days." ...Love this one...  
The son said, "That's terrible. Why haven't you eaten in 38 days?"  
The mother answered, "Because, I didn't want my mouth to be full in case you should call."

~~~~~

A Jewish man said that when he was growing up, they always had two choices for dinner - Take it or leave it.

~~~~~

A Jewish boy comes home from school and tells his mother he has a part in the play. She asks, "What part is it?" The boy says, "I play the part of the Jewish husband." The mother scowls and says, "Go back and tell the teacher you want a speaking part."

<J>~<O>~<K>~<E>~<S>~~<of>~<the>~~<W>~<E>~<E>~<K>

From: "Ray Beloate" [beerman@rittermail.com](mailto:beerman@rittermail.com)

### A FASCINATING SHORT SEA STORY

The passenger steamer SS Warrimoo was quietly knifing its way through the waters of the mid-Pacific on its way from Vancouver to Australia. The navigator had just finished working out a star fix and brought the master, Captain John Phillips, the result. The Warrimoo's position was LAT 0° 31' N and LON 179 30' W.

The date was 31 December 1899.

"Know what this means?" First Mate Payton broke in, "We're only a few miles from the intersection of the Equator and the International Date Line".

Captain Phillips was prankish enough to take full advantage of the opportunity for achieving the navigational freak of a lifetime. He called his navigators to the bridge to check & double check the ships position. He changed course slightly so as to bear directly on his mark. Then he adjusted the engine speed. The calm weather & clear night worked in his favor.

At midnight the SS Warrimoo lay on the Equator at exactly the point where it crossed the International Date Line! The consequences of this bizarre position were many:

The forward part (bow) of the ship was in the Southern Hemisphere & in the middle of summer.

The rear (stern) was in the Northern Hemisphere & in the middle of winter.

The date in the aft part of the ship was 31 December 1899.

In the bow (forward) part it was 1 January 1900.

This ship was therefore not only in:

Two different days,

Two different months,

Two different years,



Two different seasons

But in two different centuries - all at the same time.

<J>~<O>~<K>~<E>~<S>~<of>~<the>~<W>~<E>~<E>~<K>

From: Douglas Dudash



<J>~<O>~<K>~<E>~<S>



<J>~<O>~<K>~<E>~<S>~<of>~<the>~<W>~<E>~<E>~<K>

From: "Richard Morehouse" [richard@pantherfish.com](mailto:richard@pantherfish.com)

**YOU MIGHT BE A REDNECK JEDI IF:**

**\*Your Jedi robe is a camouflage color.**

**\*You have ever used your light saber to open a bottle of Boone's Farm Strawberry Hill.**

**\*You think the best use of your light saber is picking your teeth.**

**\*At least one wing of your X-wing is primer colored.**

**\*There is a blaster rack in the back of your landspeeder.**

**\*You have bantha horns on the front of your landspeeder.**

**\*You can easily describe the taste of an Ewok.**

**\*You can find no grammatical errors in the way Yoda talks.**

**\*You think that Stormtroopers are just KKK members with really good sheets.**

**\*You have ever had an X-wing up on blocks in your yard.**

**\*You ever lost a hand during a light saber fight because you had to spit.**

**\*The worst part of spending time on Dagoba is the dadgum skeeters.**

**\*Wookies are offended by your b.o.**

**\*You have ever used the force to get yourself another beer so you didn't have to wait for a commercial.**

**\*You have ever used the force in conjunction with fishing/bowling.**

**\*You have ever used a light sabre to clean fish or open a non-twist-off bottle of beer.**

**\*Your father has ever said to you, "Shoot, son, come on over t' the dark side ... it'll be a hoot."**

**\*You have ever had your R-2 unit use its self-defense electro-shock thingy to get the bar-b-q grill to light.**

<YOU>~<>~<JUST>~<>~<CAN'T>~<>~<MAKE>~<>~<THIS>~<>~<STUFF>~<>~<UP!>

**YOU JUST CAN'T MAKE THIS STUFF UP!**

From: "Tim Bolgeo" [tbolgeo@epbfi.com](mailto:tbolgeo@epbfi.com)

**HALL OF FAME ANNOUNCER SAYS HE'LL NEVER WATCH ANOTHER GAME**

11/05/2017, Source: cbssports.com , by: Mike Axisa

<http://americanactionnews.com/articles/hall-of-fame-announcer-says-he-ll-never-watch-another-game>



By Josh Hallett from Winter Haven, FL, USA (Lucas Oil Stadium - Indianapolis Colts) [CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0>)], via Wikimedia Commons

Saturday night, former Dodgers announcer and Hall of Famer Vin Scully was at the Pasadena Civic Center for an event called "An Evening With Vin Scully."

At some point during the event, Scully was asked about the NFL's national anthem protests, in which players have taken a knee during the anthem to protest police brutality and racism. Scully said he "will never watch another NFL game" because of the protests.

Why I love Vin Scully! #IStand [pic.twitter.com/0Fry1gMD50](https://pic.twitter.com/0Fry1gMD50)  
— Larry Kruger (@Krug\_Dog) November 5, 2017

Read more at <http://americanactionnews.com/articles/hall-of-fame-announcer-says-he-ll-never-watch-another-game#tzBFSC4rHVkDqY4I.99>

<S>~<C>~<I>~<E>~<N>~<C>~<E>~<S>~<T>~<A>~<R>~<T>~<S>~<H>~<E>~<R>~<E>

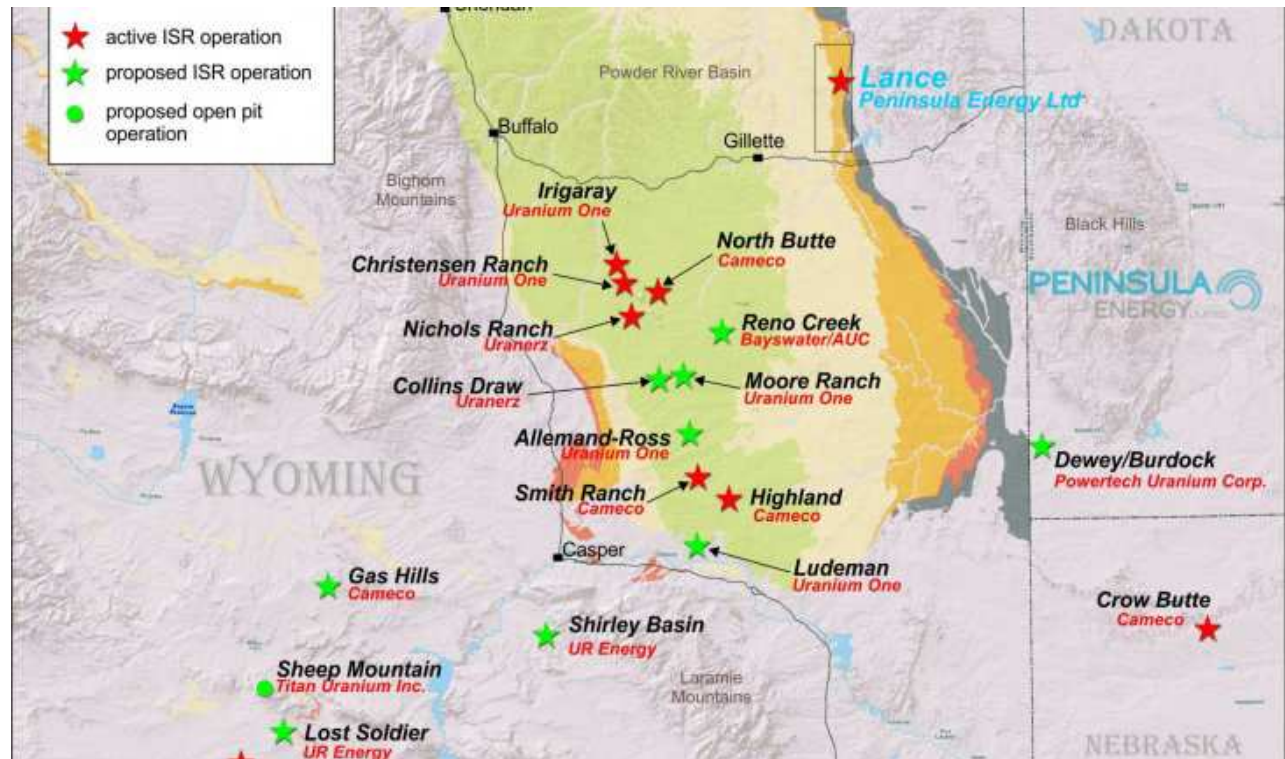
From: "Tim Bolgeo" [tbolgeo@epbfi.com](mailto:tbolgeo@epbfi.com)



## SLIGHTLY ACIDIC SOLUTION IN INSITU URANIUM MINING BOOSTS RECOVERY BY OVER TEN TIMES

brian wang | October 30, 2017 |

<https://www.nextbigfuture.com/2017/10/slightly-acidic-solution-in-insitu-uranium-mining-boosts-recovery-by-over-ten-times.html>



RBP

Peninsula Energy has started the process to amend the license and permits for its Lance in-situ leach (ISL) uranium project in Wyoming, after laboratory tests showed that using an acidic rather than alkaline mining solution could potentially transform the project's operating performance and costs.

Tests using mildly acidic solutions have shown greatly increased recovery, with solution grades of 295 mg per liter U<sub>3</sub>O<sub>8</sub>. This is over 10 times higher than the 22 mg per liter achieved in actual alkaline operations. Transforming to a so-called "low pH recovery system" could also position the company to respond rapidly when uranium markets improve, Peninsula said. Based on its studies, the company has concluded that the project's performance under the current alkaline lixiviant process is unlikely to achieve the production rates and unit costs needed for sustainable long-term commercial success "at anything other than substantially increased uranium prices", it said.

Operations commenced at Lance's Ross Permit Area in December 2015. Perth, Western Australia-based Peninsula made its first delivery of uranium under its wholly-owned subsidiary Strata Energy Inc's 2011 sale and purchase agreement with an unnamed US utility in January 2016. Lance produced 34,500 pounds U<sub>3</sub>O<sub>8</sub> (13.3 tU) during the third

quarter of 2017, results the company said represented consistent improvement over recent quarters but which still remain below internal target levels.

At full capacity the Lance Projects development plan comprises a three stage ramp up:

Stage 1 – production rate of between 500,000 and 700,000 lbs U3O8 per annum;

Stage 2 – production rate of up to 1,200,000 lbs U3O8 per annum; and

Stage 3 – production rate of up to 2,300,000 lbs U3O8 per annum.

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**MEMPHIS MEATS EXPECTS MEAT FROM CELLS IN STORES BY 2021 AND EVENTUALLY AT \$1 PER POUND**

brian wang, October 29, 2017

<https://www.nextbigfuture.com/2017/10/cargill-bill-gates-richard-branson-backed-memphis-meats-expects-meat-from-cells-in-stores-by-2021.html>



Cargill Inc., one of the largest global agricultural companies, has joined Bill Gates and other business giants to invest in a nascent technology to make meat from self-producing animal cells amid rising consumer demand for protein that's less reliant on feed, land and water.

Memphis Meats, which produces beef, chicken and duck directly from animal cells without raising and slaughtering livestock or poultry, raised \$17 million from investors including

Cargill, Gates and billionaire Richard Branson, according to a statement Tuesday on the San Francisco-based startup's website. The fundraising round was led by venture-capital firm DFJ, which has previously backed several social-minded retail startups.

They made the first ever chicken and duck meat that were produced without the animals.

The company expects to have a product in stores by 2021.

"They're the leader in clean meat. There's no one else that far along," says venture capitalist Steve Jurvetson, whose firm led Memphis Meats' recent \$17 million Series A. Before he met Valeti in 2016, Jurvetson spent almost five years researching lab-grown meat and meat alternatives, believing the market was set to explode. "They're the only one that convinced me they can get to a price point and a scale that would make a difference in the industry," he says.

Livestock account for 14.5 percent of greenhouse gas production—more than all transportation combined.

The FAO expecting meat consumption to nearly double by 2050.

Another Silicon Valley startup, Impossible Foods, has raised almost \$300 million for a veggie burger that browns like ground beef and even "bleeds" when served rare, thanks to the presence of heme, a component of the blood molecule hemoglobin, which is also found in plants. The Impossible burger mimics the taste of a haute fast-food patty, though its consistency is not quite there—the outside caramelizes, but the interior is a tad pudding. (Gates has put money into Impossible, as well as in its competitor, Beyond Meat.)

For Memphis Meats, with its significant head start and singular focus, the path to success is straightforward. It needs to make its meats more appetizing and much cheaper.

This summer they invited more than 25 people to sample fried chicken and duck à l'orange. The event was deemed a success. "They really nailed the texture and mouthfeel," one guest, sustainable food advocate Emily Byrd, said. But it was expensive. Growing that "poultry" cost about \$9,000 per pound. At his company meeting, Valeti revealed that the most recent harvest, in May, had been considerably cheaper, with the meat costing \$3,800 per pound. "I want it to keep going down by a thousand dollars a month," said Valeti. "Our goal is to get to cost parity, and then beat commercial meat."

They want to get to \$1 per pound for meat.

Memphis Meats could persuade influential chefs to feature its wares on their menus. Another would be genetically engineering nutritional profiles so the company could tout increased health benefits—adding, say, omega-3 fatty acids to beef to make it as healthy as salmon.

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**NASA'S ORION EMBRACES APOLLO'S HEAT SHIELD HERITAGE**

Nov 1, 2017 Mark Carreau | Aerospace Daily & Defense Report



[http://aviationweek.com/space/nasa-s-orion-embraces-apollo-s-heat-shield-heritage?NL=AW-05&Issue=AW-05\\_20171102\\_AW-05\\_743&sfvc4enews=42&cl=article\\_3&utm\\_rid=CPEN1000003019593&utm\\_campaign=12371&utm\\_medium=email&elq2=6214e15a9da346d89977b6e72ee5823c](http://aviationweek.com/space/nasa-s-orion-embraces-apollo-s-heat-shield-heritage?NL=AW-05&Issue=AW-05_20171102_AW-05_743&sfvc4enews=42&cl=article_3&utm_rid=CPEN1000003019593&utm_campaign=12371&utm_medium=email&elq2=6214e15a9da346d89977b6e72ee5823c)



**HOUSTON—It's no accident that NASA's Orion crew capsule resembles its smaller Apollo predecessor.**

Within aerospace circles, Orion was famously described as "Apollo on steroids," when the four-person spacecraft and its mission of transporting astronauts to the Moon before 2020 was unveiled by NASA a dozen years ago as part of the now-canceled Constellation program.

Now the lunar surface is back, according to U.S. Vice President Mike Pence, chair of the recently re-established White House National Space Council, and European Space Agency Director General Jan Woerner, an early advocate for a multinational "Moon village" at the lunar south pole. NASA's future lunar surface exploration is coupled with a possible lunar-orbiting Deep Space Gateway under the Trump administration's still-evolving space policy.

Orion, redirected to the Martian environs during the Obama administration, was launched for the first time uncrewed in December 2014 and orbited the Earth three times as the focus of NASA's Exploration Flight Test-1 (EF-1). A date for the first launch of Orion with astronauts, EM-2, remains under review as well.

Yet thanks to nine Apollo missions that ferried 27 astronauts to the Moon and back between 1968 and 1972, NASA knows a lot about what to expect from Orion, and particularly its mission-critical thermal protection system, or heat shield, which at lunar re-entry velocities must endure temperatures of more than 5,000F. That compares with the 3,000F temperatures experienced by the space shuttle as it descended from Earth orbit to runway landings.

During even faster atmospheric re-entries returning from Mars—if astronauts do not stop first at the lunar Deep Space Gateway—temperatures on Orion’s heat shield would soar even higher.

Since about 2005, NASA engineers and Lockheed Martin, the agency’s Orion prime contractor, have turned from time to time to preserved Apollo command modules and components as well as engineering reports, test data and retirees from the era to obtain a deeper understanding of the design and performance of the ablative Apollo Avcoat heat shielding also selected for Orion.

“It’s one of those things where Apollo happened and then we were basically in low Earth orbit for quite a while,” explained Ronald Baccus, the Orion program’s structures and thermal protection systems area manager at NASA’s Johnson Space Center. He was referring to former President Richard Nixon’s decision to halt Apollo in favor of shuttle development, which eventually supported the assembly of the 15-nation International Space Station.

“But they are there for us,” he said of Apollo’s legacy elements. “We were able to access them, whether it was through the Smithsonian or through our own internal archives, pulling reports and hardware or talking to people to bridge gaps.”

Now in the custody of the Smithsonian Institution and/or housed in museum and educational settings, much of Apollo’s well-preserved legacy is on public display.

When Orion engineers look back to reassess Apollo hardware, they do so with complex computer modeling, laser scans and other technologies not available to NASA a half century ago—leaving them in awe of what their skilled predecessors managed to accomplish with slide rules, craftsmanship and sound testing, Baccus said.

Among their findings, the thickness of Orion’s Apollo-heritage Avcoat ablative heat shield can likely be increased to accommodate a descent with astronauts returning directly from Mars.

Current public venues for Apollo command modules that have made Orion contributions include the Smithsonian Air and Space Museum in Washington, D.C. (Apollo 11’s Columbia); the Virginia Air and Space Center of Hampton, Virginia (Apollo 12’s Yankee Clipper); Space Center Houston (Apollo 17’s America); and the Chicago Museum of Science and Industry (Apollo 8).

“Never let a crisis go to waste,” explained Allan Needell, curator of Apollo artifacts at the Air and Space Museum as he introduced Apollo 11’s Columbia command module in October at Space Center Houston. It was the first stop on a multiyear national tour organized by the Smithsonian as a tribute to the first lunar landing by Neil Armstrong and Buzz Aldrin on July 20, 1969.

The comment came with more than a touch of irony. His Washington museum embarked on an ambitious remodeling of its Milestones of Flight Gallery, Columbia’s permanent home. This afforded the opportunity for a thorough redocumentation of the command module, inside and out. Unable to complete the remodeling by the 50th anniversary of Apollo 11, the

Air and Space Museum devised the tour, which will take the module from Houston to St. Louis, Pittsburgh and finally Seattle for public display during the buildup to the anniversary.

“This was an opportunity to study [Columbia] and preserve it as we never had before. One of the things we were able to do was basically an inch-by-inch inspection. We learned a lot,” Needell said. “We brought in people who were working on the thermal protection system for Orion. They were very interested in exploring this. There were a lot of lessons learned, all kinds of interesting things about materials. But most importantly, what we were able to do was take advantage of a program that was already underway at the Smithsonian for digitally modeling historical artifacts.”

Much of Columbia had been covered in protective Plexiglas for four decades as the upgrade got underway.

In all, that phase of the Smithsonian’s internal and external documentation of the Columbia module generated seven terabytes of data for engineering evaluations as well as high-definition 3D visual displays of the spacecraft for museum patrons.

Studies of Columbia, heat shield core samples from Apollo—whose three-man crew became the first to leave Earth orbit for the Moon and return to Earth—and results from the EFT-1 flight have helped mature Orion’s thermal protection system.

That led to the 2009 decision that Avcoat, with its ablative qualities, could make the heat shield transition from Apollo to the larger Orion. Ablation, or the calculated erosion of the heat shield due to the friction of high-velocity re-entry, allows Orion to shed heat without significant changes to the aerodynamics. The aerodynamics are crucial to predicting the spacecraft’s flight path as it makes its way through the atmosphere, and in cushioning the capsule’s structure from the impact as it touches down in ocean waters.

Studies of the proprietary fibrous ingredients within the Apollo Avcoat heat shield helped to convince Orion engineers that those fibers should preserve an adequately thick char layer for their future lunar and Mars missions as well.

The assessment also required Orion engineers to assess how Avcoat performed around Apollo’s thrusters and sealed surfaces.

Though Orion was able to inherit Apollo’s Avcoat, EFT-1 led to a significant change in the way the ablative material was applied by hand to an aluminum and fiberglass honeycomb Apollo structure. The process proved expensive and time consuming, and produced voids and irregularities that had to be inspected and repaired, leaving signature small white circles, some still evident on Columbia’s heat shield.

Instead, the Orion Avcoat will be manufactured in tailored blocks about 1 1/2-ft. wide and appropriately contoured to conform to the back of the Orion capsule. The Avcoat is now poured into molds, cured and inspected with ultrasound before it is bonded to the capsule. The blocks are arranged as well so as not to create lengthy seams for unwanted heat flow.

As they assessed the Apollo heat shield, NASA engineers also studied the hang angle of Apollo’s parachute system, deciding that could also be passed on with modifications for the higher-mass Orion to ensure that future astronauts splash down in the ocean waters at just the right angle to protect their spines from absorbing too much of the impact loads

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## **COSMIC-RAY PARTICLES REVEAL SECRET CHAMBER IN EGYPT'S GREAT PYRAMID**

Researchers use muon detectors to find a hidden 30-meter-long space, which could help reveal how the 4,500-year-old monument was built

By Jo Marchant, Nature magazine on November 2, 2017

<https://www.scientificamerican.com/article/cosmic-ray-particles-reveal-secret-chamber-in-egypts-great-pyramid/>



Credit: Jerome Bon Flickr (CC BY 2.0)

Physicists have used the by-products of cosmic rays to reveal a large, previously unidentified chamber inside the 4,500-year-old Great Pyramid in Giza, Egypt. The find is the first discovery since the nineteenth century of a major new space inside the pyramid.

Egyptologists have been quick to dismiss any idea of finding lost treasure in the 30-metre-long void. “There’s zero chance of hidden burial chambers,” says Aidan Dodson, an Egyptologist at the University of Bristol, UK, who studies ancient Egyptian tombs. But experts hope that the finding will lead to significant insights into how this spectacular pyramid was built.

The Great Pyramid was constructed by the pharaoh Khufu (also known as Cheops), who reigned from 2509–2483 bc. Constructed from limestone and granite blocks, and rising to

139 metres, it is the oldest and largest of the Egyptian pyramids and one of the most impressive structures to survive from the ancient world.

### CHAMBER LAYOUT

Whereas other pyramids from this period sit above underground burial chambers, Khufu's Pyramid contains several large rooms inside the body of the structure itself. These include the King's chamber, which still holds a stone sarcophagus, the smaller Queen's chamber and a sloping passageway known as the Grand Gallery.

These large chambers were discovered in the ninth century ad and explored extensively by Western archaeologists in the nineteenth century. But enthusiasts have wondered ever since whether there might be more hidden chambers inside the pyramid, or even whether the king's real burial chamber is yet to be found.

"There are so many theories—nice ones but also crazy ones," says Mehdi Tayoubi, president of the Heritage Innovation Preservation institute in Paris. So, he co-founded an international collaboration called Scan Pyramids to find out; the project was supervised by the Egyptian Ministry of Antiquities. The group is "agnostic" about particular theories, he says, but is using non-invasive technologies to search for hidden chambers.



To see through the Great Pyramid, the researchers used a technique developed in high-energy particle physics: they tracked particles called muons, which are produced when cosmic rays strike atoms in the upper atmosphere. Around 10,000 muons rain down on each square metre of Earth's surface every minute. Sensitive muon detectors have been developed for use in particle accelerators, but they have also been used in the past decade or so to determine the inner structures of volcanoes and to study the damaged nuclear reactor at Fukushima, Japan.

## **MUON MAPS**

In December 2015, physicist Kunihiro Morishima of Nagoya University, Japan, and his colleagues placed a series of detectors inside the Queen's chamber, where they would detect muons passing through the pyramid from above. The particles are partially absorbed by stone, so any large holes in the pyramid would result in more muons than expected hitting the detectors.

After several months, "we had an unexpected line", says Tayoubi. To check the result, two other teams of physicists, from the Japanese High Energy Accelerator Research Organization in Tsukuba and the French Alternative Energies and Atomic Energy Commission in Paris, then used different types of muon detector placed in other locations both inside and outside the pyramid.

All three teams observed a large, unexpected void in the same location above the Grand Gallery (see 'The Great Pyramid's big secret'). Their results were reported in Nature on November 2. The space is at least 30 metres long, with a similar cross section to the Grand Gallery. "It was a big surprise," says Tayoubi. "We're really excited."

The chamber could be either horizontal or inclined, the researchers say, and might be made up of two or more smaller spaces. The purpose of the space is unknown, but Tayoubi suggests that it could be "a second Grand Gallery".

With high, corbelled—or stepped—ceilings and mysterious stone benches, the Grand Gallery is "one of the most fantastic rooms constructed in the ancient world", says Bob Brier, an Egyptologist at Long Island University in Brookville, New York, who co-wrote the 2008 book *The Secret of the Great Pyramid* (Smithsonian). "If there's another one, that's real news."

## **THEORIES ABOUND**

The newly discovered space is unlikely to contain any artefacts relating to the king's burial, says Dodson, because there's already a burial chamber with a sarcophagus in it. Instead he speculates that the space might be a "relieving chamber", intended to reduce the weight of masonry pressing down on the Grand Gallery. Similar relieving chambers are seen above the King's chamber and in the pyramid of Khufu's father, Sneferu, at Meidum, another pyramid site in Egypt.

But Colin Reader, an independent geologist and engineer based in Liverpool, UK, who has studied Egyptian pyramids, suggests that the new chamber is too far from the Grand Gallery to serve this purpose. He wonders whether, just as the Grand Gallery leads to the King's chamber, the void might lead to another, higher chamber. "You would want to investigate and rule that out," he says.

Brier has a third theory. In 2007, he and French architect Jean-Pierre Houdin suggested that the Grand Gallery formed part of a huge counterweight system. Weights sliding down the floor of the Grand Gallery could have raised the hefty, granite blocks that comprise the King's chamber, he says. He speculates that the new space could be part of a second counterweight system higher up.



The results also seem to reject the theory, put forward by Houdin and Brier, that the builders of the Great Pyramid used an internal ramp to raise blocks up to the highest levels. "These data suggest that the ramp is not there," says Brier. "I think we've lost."

Tayoubi says that he next wants to scan Khafre's (also known as Chephren's) Pyramid, Egypt's second largest pyramid. A team led by Nobel-prizewinning physicist Luis Alvarez carried out muon imaging in this pyramid in the late 1960s, using spark chambers as detectors and recording the cosmic-ray data on magnetic tape.

They reported no new chambers in the areas scanned. But technology has improved dramatically since then, points out Tayoubi.

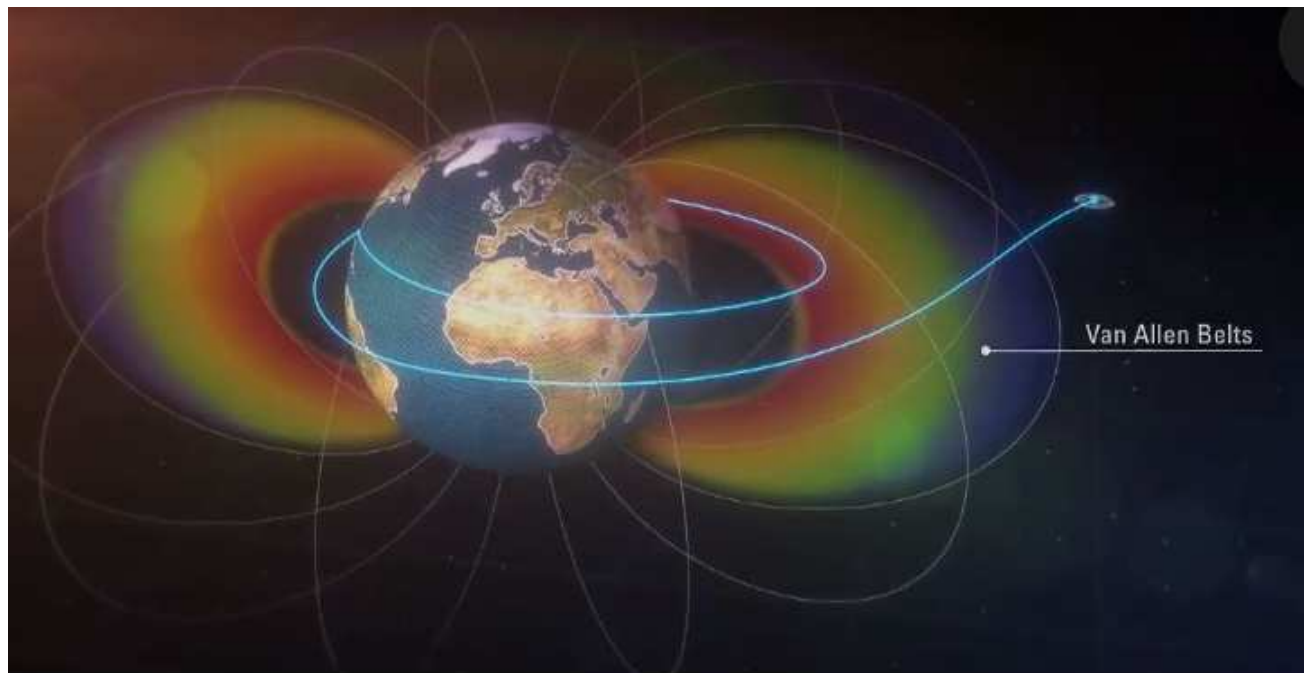
"I think Alvarez was a real visionary guy," says Tayoubi. "He had the right idea, maybe too early. Our dream would be to give a tribute to Alvarez and redo the Khafre experiment, to see if he was right."

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#### HOW NASA PLANS TO GET HUMANS BACK TO THE MOON (VIDEO)

By Elizabeth Howell, Space.com Contributor | November 2, 2017 07:35am ET

<https://www.space.com/38635-nasa-moon-return-exploration-mission-1-video.html>



VIDEO OF NASA'S PLANNED MISSION IS LOCATED AT THE WEBSITE.

It's been 45 years since a crewed spacecraft journeyed toward the moon with a "trans-lunar injection," but NASA plans to make that happen again in just a few years. The agency recently released a video showing the profile for the first uncrewed test of its new moon mission profile, called Exploration Mission 1 (EM-1).

The test is scheduled for 2019 (following some delays), and will be the first integrated test of both the Space Launch System — NASA's rocket to bring astronauts into deep space — and the new Orion spacecraft.

The mission will take roughly 25.5 days, and its highlight will be putting the spacecraft in a lunar orbit that will take it farther from Earth than any other crew-capable spacecraft has been. Orion's peak distance will be 270,000 miles (435,000 kilometers) from the planet — about 1,000 times the distance from Earth to the International Space Station.

The plan calls for EM-1 to depart Earth, cruise for four days to the moon and then inject itself into an elliptical orbit around the moon. After working in the moon's neighborhood for a week, EM-1 will leave lunar orbit and spend four days returning to Earth. It will re-enter the atmosphere at 24,500 mph (39,450 km/h) and splash down in the Pacific Ocean within sight of a recovery ship.

"This is the first of many missions to come that will use the deep-space exploration system to prepare our team, our ship and our astronauts for human operations in deep space," NASA mission manager Mike Sarafin said in the video. A human test mission is scheduled to follow around 2023.

Although the test has been in the works since the Obama administration — it was framed as a stepping-stone to bring astronauts to Mars — it has a different significance for the Trump administration. Earlier this month, Vice President Mike Pence announced that the United States will target human moon landings as well as Mars missions; the last human crew to the moon departed from there in 1972.

"We will return American astronauts to the moon, not only to leave behind footprints and flags, but [also] to build the foundation we need to send Americans to Mars and beyond," Pence said Oct. 5 at the first meeting of the newly reinstated National Space Council.

The newly announced presidential moon plans follow at least two other Republican administrations' plans to go there: Both the Space Exploration Initiative (championed by George H.W. Bush in 1989) and the Constellation program (powered by a speech by his son, President George W. Bush, in 2004) included plans to return humans to the moon. Both initiatives were eventually canceled.

Before this month's announcement about lunar initiatives, NASA's human-mission focus was on using the International Space Station for long-term space exploration research and sending humans to Mars around the 2030s.

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Nick Lavars, November 3, 2017

<https://newatlas.com/cancer-drug-trodoquamine-fat-melting/52043/>

A drug developed originally to treat breast cancer and diabetes has been found to offer an unexpected and beneficial side effect. Scientists have discovered a single dose of Trodoquamine can completely reverse the effects of atherosclerosis, a disease defined by

fatty deposits inside the arteries, raising the prospect of new preventative medicines for heart attacks and strokes.



Scientists have discovered that a cancer drug can also combat fatty arteries by reducing inflammation and mimicking exercise(Credit: lightsource/Depositphotos)

Atherosclerosis is the accumulation of cholesterol plaque on the artery walls, fatty deposits that harden over time and narrow the arteries. This limits the flow of oxygen-rich blood through the body and can lead to very serious health problems.

Lifestyle change remains the main treatment for atherosclerosis, but scientists have looked to a number of experimental technologies as a way of treating the inflammation associated with the condition over a shorter time frame. These include avocado compounds and biodegradable nano "drones" that deliver anti-inflammatory drugs and dissolve in the body.

The drug Trodusquemine, which is currently being trialed as a treatment for breast cancer and diabetes, was somewhere they hadn't looked. Researchers at the University of Aberdeen tested the drug on mice with set-in atherosclerosis to simulate the condition in humans, and found that not only did it reduce fatty plaques inside the arteries, a one-off dose seemed to have the same effect as regular doses administered over time.

According to the researchers, the drug works by blocking an enzyme called PTP1B, which is increased in people with obesity, diabetes and conditions that involve prolonged inflammation. Meanwhile, they found that the drug stimulates another protein called AMPK which mimics exercise and actively reduces chronic inflammation.

"Trodusquemine has already been trialed for treatment of diabetes and breast cancer but this is the first time it has been used in models of atherosclerosis," said lead researcher

Professor Mirela Delibegovic. "These have only been tested at pre-clinical level, in mice, so far but the results were quite impressive and showed that just a single dose of this drug seemed to completely reverse the effects of atherosclerosis. The next step is to test the ability of this drug to improve outcomes in human patients with developed atherosclerosis and cardiovascular disease."

The research was published in the journal Clinical Science.

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### **3D PRINTING DOUBLES THE STRENGTH OF STAINLESS STEEL**

A new technique is set to strengthen 3D printed stainless steel parts, such as this previously printed rocket engine component.

By Robert F. Service, Lawrence Livermore National Laboratory, Oct. 30, 2017 , 12:00 PM  
<http://www.sciencemag.org/news/2017/10/3d-printing-doubles-strength-stainless-steel>



3D printing has taken the world by storm, but it currently works best with plastic and porous steel—materials too weak for hard-core applications. Now, researchers have come up with a way to 3D print tough and flexible stainless steel, an advance that could lead to faster and cheaper ways to make everything from rocket engines to parts for nuclear reactors and oil rigs.

Stainless steel was first invented nearly 150 years ago, and it remains widely popular today. It's made by melting conventional steel—itsself a combination of iron and carbon (and sometimes other metals like nickel)—and adding in chromium and molybdenum, which prevent rust and corrosion. A complex series of cooling, reheating, and rolling steps gives



the material a microscopic structure with tightly packed alloy grains and thin boundaries between the grains that create a cell-like structure. When the metal is bent or stressed, planes of atoms in the grains slide past one another, sometimes causing crystalline defects to connect with each other—producing fractures. But strong boundaries can halt these defects, making the material tough, yet still flexible enough to be formed into a desired shape.

3D printing researchers have long tried to reproduce this structure. Their setup starts with a powdery layer of metal alloy particles laid on a flat surface. A computer-controlled, high-powered laser beam then advances back and forth across the surface. Particles hit by the laser melt and fuse together. The surface then drops down a step, another layer of powder is added, and the laser heating process repeats, binding the newly melted material to the layer below. By repeating this tier-by-tier addition, engineers can build complex shapes, such as rocket engines.

The problem has been that, on a microscopic level, printed stainless steels are usually highly porous, making them weak and prone to fracture. “The performance has been awful,” says Yinmin “Morris” Wang, a materials scientist at Lawrence Livermore National Laboratory in California. Several years ago, Wang and his colleagues came up with an approach for using lasers and a rapid cooling process to fuse metal alloy particles together in a dense, tightly packed structure.

Now, they’ve extended that work by designing a computer-controlled process to not only create dense stainless steel layers, but to more tightly control the structure of their material from the nanoscale to micron scale. That allows the printer to build in tiny cell wall-like structures on each scale that prevent fractures and other common problems. Tests showed that under certain conditions the final 3D printed stainless steels were up to three times stronger than steels made by conventional techniques and yet still ductile, the scientists report today in *Nature Materials*.

“What they have done is really exciting,” says Rahul Panat, a mechanical engineer at Carnegie Mellon University in Pittsburgh, Pennsylvania. What’s more, Panat says, is that Wang and his colleagues used a commercially available 3D printer and laser to do the work. That makes it likely that other groups will be able to quickly follow their lead to make a wide array of high-strength stainless steel parts for everything from fuel tanks in airplanes to pressure tubes in nuclear power plants. And that, in turn, will likely only increase the growing fervor over 3D printing.

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**DISCOVERED: A (THEORETICAL) FUSION TECHNIQUE 8 TIMES STRONGER THAN ONE IN H-BOMB**

By [Nathaniel Scharping](#) | November 3, 2017 2:11 pm  
<http://blogs.discovermagazine.com/d-brief/2017/11/03/fusion-technique-hydrogen-bomb/#.WqHi1GiJPY>

When hydrogen atoms fuse together, they release a vast amount of energy. That’s the principle that makes hydrogen bombs so frighteningly powerful, and it’s part of what powers our sun as well. Now, researchers from the Large Hadron Collider (LHC) say they’ve

uncovered a kind of theoretical particle fusion that's almost eight times more energetic than the fusion of two hydrogen atoms.



CERN, which houses the Large Hadron Collider. (Credit: Dominionart/Shutterstock)

The discovery, [reported in Nature this week](#), came during the course of an experiment aimed at making a doubly charmed baryon. That's some heady physics-speak, but baryons are just a class of sub-atomic particle — both protons and neutrons are baryons — and the “charmed” moniker simply refers to the kind of quarks — the tiny particles that comprise larger ones like protons and neutrons — it's made out of. So, a doubly-charmed baryon is a particle made from two charm quarks and one up quark. Got it?

## ZOOM, CRASH

Researchers are continuously running experiments with the LHC to see what kinds of particles they can create by smashing atoms into one another. When the atoms go fast enough, they're broken apart by the collision, and sometimes the energy involved is enough to force particles together into new configurations. These new particles let the researchers test assumptions about their grand theory of physics, called the “Standard Model,” which describes how every particle in the universe interacts with each other.

When observing their new, doubly-charmed baryon, researchers from the University of Chicago and Tel Aviv University found that it took a lot of energy to force the two charm quarks together, about 130 megaelectronvolts (MeV). There's a payoff for that effort though, because the process of fusion ends up producing even more energy, for a net release of 12



MeV for the two charm quarks. That's only about two-thirds of what we get from normal hydrogen fusion, but when the researchers extrapolated that reaction to another kind of quark, the much heavier bottom quark, those numbers went way up.

Theoretically, fusing two bottom quarks takes about 230 MeV, but the payoff is exponentially larger, around 138 MeV. That's almost eight times as much as hydrogen fusion, making the explosive result that much bigger.

**THAT'S A LOT!**

The largest hydrogen fusion bomb ever tested was the Russian Tsar Bomba, which gave off about 50 megatons (or 50 million tons) of TNT worth of energy. The Nagasaki-leveling "Fat Man" nuclear bomb only produced around 20 kilotons of energy, or 2,500 times less. Multiplying those numbers by eight is an insanely scary exercise.

Here's where we tell you not to worry though. First of all, this kind of bottom quark fusion is totally theoretical, it's never been seen before. And, most importantly, we couldn't make a bomb out of bottom quarks. That's because they only exist for roughly one picosecond, or one-trillionth of a second. That's barely enough time to record their existence, much less do anything with them. Hydrogen bombs are based on a principle of chain reactions, where one pair of fusing hydrogen atoms sets off the next, and so on. Bottom quarks could never do this because they don't exist for long enough to set each other off.

"If I thought for a microsecond that this had any military applications, I would not have published it," says co-author Marek Karliner of Tel Aviv University in Israel, [speaking to Live Science](#).

The fusion of a single pair of bottom quarks might be possible, the researchers say, but that's it. After that, they disappear, decaying into far lighter quarks that are nowhere near as dangerous.

So, planet-ending bottom quark bombs are nothing to worry about. The [threat of thermonuclear war](#) on the other hand...

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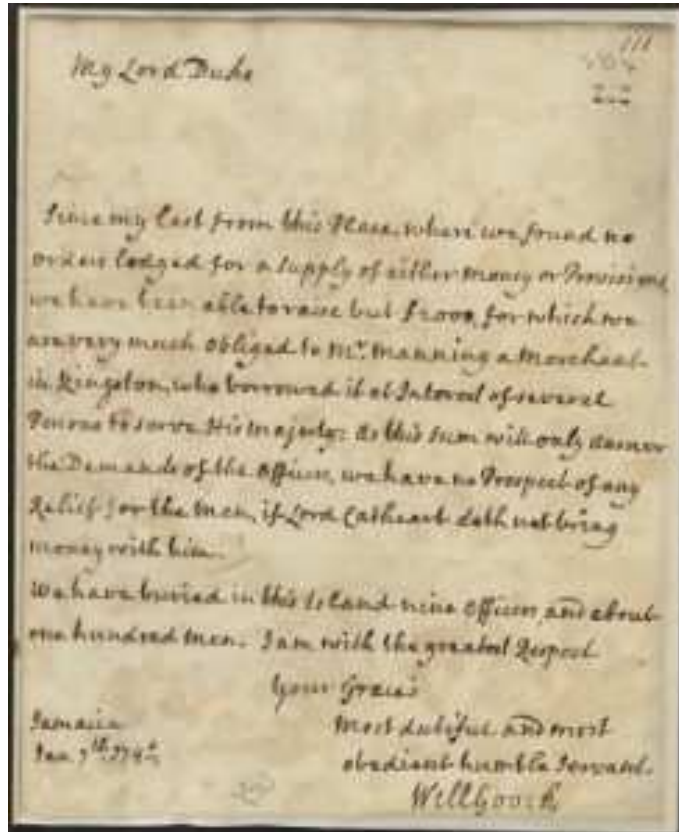
From: "Chris Cowan" [cowanc1028@earthlink.net](mailto:cowanc1028@earthlink.net)

This is from Library Journal. I can imagine it was prove to be a wonderful resource - the only questions being how old a style of hadnwriting (i.e., what TYPE handwriting) can be searched. Historians, genealogists...now if it can be tweaked to to things like Fraktur (German) and medieval scripts - wow. Dunno how divergent Tudor era script is, nor, of course, how much digitized material is available..

**ADAM MATTHEW ENABLES FULL-TEXT SEARCH OF HANDWRITTEN MANUSCRIPTS**

By Matt Enis on October 26, 2017

<http://lj.libraryjournal.com/2017/10/technology/adam-matthew-enables-full-text-search-handwritten-manuscripts/#>



Adam Matthew Digital last month announced the launch of Handwritten Text Recognition (HTR), an artificial intelligence (AI) technology that enables full-text searching of digitized, handwritten manuscript collections.

“It continues to return really remarkable results on even poor quality hand writing,” Glyn Porritt, head of Technical for Adam Matthew, an independent subsidiary of SAGE, told LJ. “We have undertaken research on samples of material and our estimates are an equivalence of 90 percent accuracy.”

Handwriting recognition technology has been used for more than two decades for purposes such as signature verification at banks and mail sorting at post offices. However, the handwritten address interpretation systems used to sort mail can narrow and validate results by relying on zip code directories and databases of known addresses. Modern

notetaking apps on tablets and smartphones use machine learning to adapt to the handwriting of a device’s most frequent user. HTR is unique because it has neither of these advantages—the system is working with collections of source material written in a variety of scripts, with no pre-existing databases or transcriptions to cross-check.

Adam Matthew has been investigating the possibility of using HTR for handwritten primary source collections for a number of years, Porritt said. “However, it is in the last few years that they have seen significant progress in the development of AI technologies in this area.”

Standard Optical Character Recognition (OCR) software can fail to decipher text even in printed documents if they have uncommon typefaces, unusual spacing, stains or water damage, or fading. Even with manuscripts written in a legible, consistent hand, HTR is grappling with some combination of these issues.

“Over the years, we have certainly faced a variety of challenges regarding age and quality of typesetting having an impact on the quality of full text OCR search results,” Porritt said. “We have always invested in high quality scans, cleaned up text where necessary, and in recent years we have found software solutions to 18th century fonts and Gothic texts.... Handwriting takes this challenge to a whole new level. This is especially the case in our circumstance of working with very large volumes of manuscript material in multiple hands.”

Porritt said that Adam Matthew “had researched the prospect of providing additional [OCR] training for a certain style of hand writing or support from keyed transcriptions. However, this technology delivers search results without such additional requirements, and as a

result has dramatically broken down barriers to deliver HTR for large primary source collections.”

HTR utilizes neural networks that train the software to recognize a wide variety of handwritten characters in their linguistic context, Porritt said. But, the system doesn't generate transcripts of these source documents. Instead, search results are supported by algorithms that assess the probability of characters matching the words in a user's search. Search results are displayed as snippets from the manuscript. Users then select a snippet and are directed to the page of the manuscript where the search result appears.

Adam Matthew launched HTR last month with Colonial America, Module III: The American Revolution, which includes “intercepted letters between colonists, the military correspondence of the British commanders in the field, as well as two copies of the ‘Dunlap’ edition of the Declaration of Independence printed on the night of the 4th–5th July 1776,” Porritt said. The complete Colonial America collection, once all five modules are released, will consist of over 750,000 pages and 160 million words of original correspondence between the British government and the governments of the American colonies, 1606–1822 (CO 5 series from The National Archives, UK), making HTR a vital tool for navigating this content.

“Manuscript volumes rarely have indexes,” Porritt noted. “Keywords and metadata have traditionally brought the researcher towards the relevant document but they then have to find pertinent areas of that work themselves. With HTR technology, the user can be taken straight to a highlighted word or words.”

The team at Adam Matthew has also begun experimenting with automated keyword lookups to flag the frequency of different terms used in the collection. “We think this is just the start of opening up a range of data mining opportunities that will continue to increase in the future as we continue to develop the great potential of this technology,” Porritt said. “There is no doubt that it has an exciting future.”

In addition to Colonial America, Florence Nightingale correspondence in Adam Matthew's Medical Services and Warfare collection is now HTR searchable, and the company is in the process of indexing over one million pages of content for its East India Company collection, which is scheduled for release in early 2018.

“Given the enthusiastic response to the HTR functionality in Colonial America, we are keen to follow this up and further enhance the research opportunities of additional manuscript content,” Porritt said. “We will be reviewing suitable content for future collections as a priority during the rest of 2018. The Mass Observation archive, for example, is one we have noted would see great benefits from HTR search ability.”

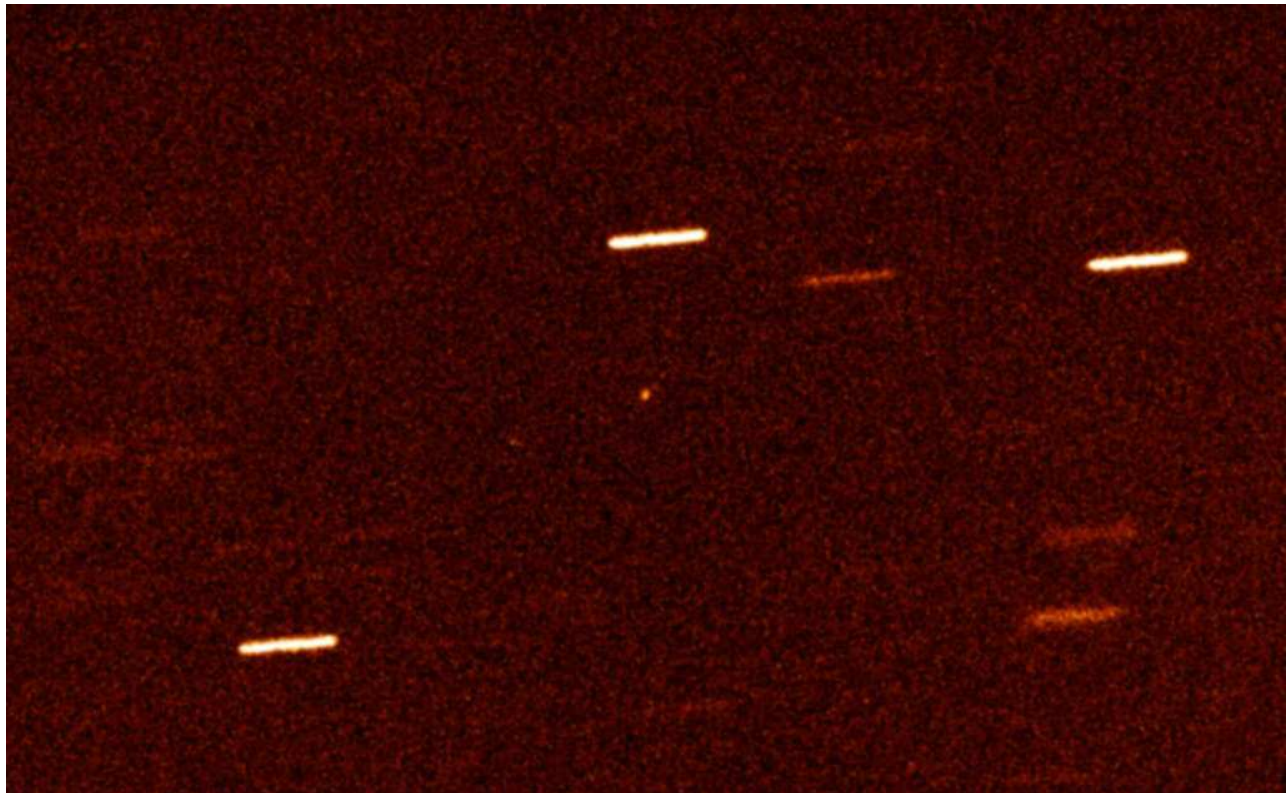
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From: "William Green" [whgconsulting@gmail.com](mailto:whgconsulting@gmail.com)

## ASTRONOMY PICTURE OF THE DAY

Discover the cosmos! Each day a different image or photograph of our fascinating universe is featured, along with a brief explanation written by a professional astronomer.

2017 November 3



**A/2017 U1: An Interstellar Visitor**

**Image Credit: Alan Fitzsimmons (ARC, Queen's University Belfast), Isaac Newton Group**

**Explanation: Traveling at high velocity along an extreme hyperbolic orbit and making a hairpin turn as it swung past the Sun, the now designated A/2017 U1 is the first known small body from interstellar space. A point of light centered in this 5 minute exposure recorded with the William Herschel Telescope in the Canary Islands on October 28, the interstellar visitor is asteroid-like with no signs of cometary activity. Faint background stars appear streaked because the massive 4.2 meter diameter telescope is tracking the rapidly moving A/2017 U1 in the field of view. Astronomer Rob Weryk (IfA) first recognized the moving object in nightly Pan-STARRS sky survey data on October 19. A/2017 is presently outbound, never to return to the Solar System, and already only visible from planet Earth in large optical telescopes. Though an interstellar origin has been established based on its orbit, it is still unknown how long the object could have drifted among the stars of the Milky Way. But its interstellar cruise speed would be about 26 kilometers per second. By comparison humanity's Voyager 1 spacecraft travels about 17 kilometers per second through interstellar space.**

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**From: "Jim Woosley" [jimwoosley@aol.com](mailto:jimwoosley@aol.com)**

**THE PENTAGON'S NEW SUPER WEAPON IS BASICALLY A WEAPONIZED METEOR STRIKE**

**By JARED KELLER, on June 7, 2017**



<http://taskandpurpose.com/kinetic-bombardment-kep-weaponry/>



In the 1950s, Jerry Pournelle imagined the military equivalent of the extinction of the dinosaurs.

Toiling away as a Boeing operations researcher in the afterglow of the Manhattan Project and the Soviet Union's First Lightning nuclear test in 1949, the U.S. Army veteran envisioned a weapons system armed not with munitions and other chemical explosives, but massive rods forged from heavy metals dropped from sub-orbital heights. Those "tungsten thunderbolts," as the New York Times called them, would impact enemy strongholds below with the devastating velocity of a dino-extminating impact, obliterating highly fortified targets — like, say, Iranian centrifuges or North Korean bunkers — without the mess of nuclear fallout.

Pournelle, whose years of experience in aerospace would fuel a career as a journalist and military science fiction writer, named his superweapon "Project Thor." Others just called it "Rods From God." In reality, weapons researchers refer to it as a "kinetic energy projectile": a super-dense, super-fast projectile that, operating free of complex systems and volatile chemicals, destroys everything in its path.

The idea of kinetic weaponry — raining down inert projectiles on an enemy with deadly velocity — is far from a novel concept. The trebuchet was the backbone of successful sieges for hundreds of years, from ancient China to Hernan Cortes' subjugation of the Aztecs; during and after World War II, airmen have occasionally deployed clusters of inert "Lazy Dog" bombs — metal cylinders traveling at terminal velocity — on the battlefields of Korea and Vietnam.

And gravity hasn't always been necessary. For decades, militaries have used ultra-dense "kinetic energy penetrators," also known as KEPs, specially designed shells often wrapped in an outer shell (a "sabot") and fired at high velocity rather than dropped from the sky, to defeat defense armor. That's the fundamental logic underpinning the U.S.

Navy's highly touted electromagnetic railgun, which can blast a 25-pound "hypervelocity projectile" with 32-megajoule muzzle energy through seven steel plates and obliterate whatever that armor is supposed to protect.



Whether dropped from the sky or fired from a cannon, the principle behind these weapons is the same: hitting the enemy with something very hard and very dense, moving very fast. And the kinetic energy projectile may become a staple of modern warfare sooner than you might think.

In 2013, the U.S. Air Force 846th Test Squadron and civilian researchers at Lawrence Livermore National Laboratory successfully test-fired a kinetic energy projectile, a tungsten-rich shell moving at 3,500 feet-per-second — more than three times faster than the speed of sound — on a specialized track at Holloman Air Force Base in New Mexico. More recently, the Pentagon has tested the Navy electromagnetic rail gun's hypervelocity projectiles with the help of conventional U.S. Army howitzers; the Navy hopes the completed cannon will be able to launch shells at up to 4,500 mph, six times the speed of sound.

Explosives may be dazzling in their destructiveness, but there's an elegant, almost Newtonian lethality to the kinetic energy projectile, explains Matt Weingart, a weapons program development manager at Lawrence Livermore.

**“The classic way of delivering hurt against a target has been to pack a lot of chemical explosive into a container of some kind, a barrel or a cannonball or steel bomb,” Weingart told Task & Purpose in a phone interview. “The violence comes from the chemical explosive inside that bomb sending off a blast wave, followed by the fragments of the bomb case. But the difference with kinetic energy projectiles is that the warhead arrives at the target moving very, very fast — the energy is there to propel those fragments without the use of a chemical explosive to accelerate them. The more mass, the more violence.”**

**The concept of the hypersonic impact that defined Project Thor and its devastating potential hasn’t been lost on defense officials. Military researchers are continuing to explore battlefield applications that “take advantage of high terminal speeds to deliver much more energy onto a target than the chemical explosives they carry would deliver alone,” as Army Maj. Gen. William Hix put it at the Booz Allen Hamilton Direct Energy Summit in March.**

**“Think of it as a big shotgun shell,” Hix told the assembled crowd. “Not much can survive it. If you’re in a main battle tank, if you’re a crew member, you might survive but the vehicle will be non-mission capable, and everything below that level of protection will be dead. That’s what I am talking about.”**





The KEP isn't just appealing because of its elegance and relative cost-effectiveness (a super-dense tungsten warhead is relatively cheaper than conventional explosive munitions), but for its theoretical precision. The hypersonic shell is designed to defeat enemy armor and completely obliterate structures and equipment with extreme precision, whether it's fired from ground artillery or deployed from an aerial — or orbital — platform. As Weingart explains, Hix's vision is one of "raining down violence across a large area" — without, ostensibly, risking military personnel and hardware.

And the KEP's upside isn't just precision in targeting, but precision in the level of violence that the weapon actually deals out. Because the shell's "yield" is essentially a function of velocity and density rather than explosive payload, confining the impact's devastating effects to a specific area is simply a matter of physics. In theory, the KEP is "basic physics," Weingart says, "but the implementation is really, really hard physics."

"Using our high computing capabilities, we can exercise a high degree of control over those effects," says Weingart. "We've got the most extraordinary computing power in the world, and we can take exquisite knowledge of physics and put it into very sophisticated computer codes and run vast number problems to predict how things are going to behave in terms of speed and energy."

The KEP could offer a middle ground between the conventional precision GPS-guided munitions deployed by aircraft and high-yield, non-nuclear explosives like the GBU-43/B Massive Ordnance Air Blast (MOAB), or "mother of all bombs," used against ISIS militants in Afghanistan in April. By adjusting the density of the KEP, military personnel could choose between defeating the armor on a single main battle tank and delivering violence wholesale (and simultaneously) across broad swaths of an operational area, without worrying about fallout.

"On the battlefield, you could do a straightforward calculation about whether the speed or amount of explosives are the most effective part of the warhead," says Weingart. "Instead of putting explosives in, you just put in mass and heavy metals, regardless of delivery system or set of terminal conditions."



"General Hix referred to it as a shotgun," he added. "You can have a narrow or broad choke and spotlight a very small area with these effects if you're trying to pinpoint a well-localized target without damaging the surrounding area."

But what's the main purpose of these kinetic energy projectiles, other than "raining down violence" with the shock and awe that only weapons like the

“Mother of All Bombs” can inspire? For Pentagon planners, it could be to counter Russia’s tactical nuclear stockpile, according to Hix, warheads that could appear on future battlefields alongside conventional weapons thanks to ongoing miniaturization efforts, according to the DoD’s Russia New Generation Warfare Study.

Central to the weapons system’s tactical appeal isn’t its delivery mechanism, but the KEP warhead itself. While Weingart’s focus is on the KEP warhead rather than the firing system or combat context it might deploy in, he agrees with the potential application envisioned by Hix. “He is talking about the return of widespread violence to the battlefield, the fact we’ve seen the Russians do that in recent years by bombarding areas like Syria and Ukraine, the likes of which we haven’t really seen since the Korean War.”

The applications of the KEP are mainly theoretical for now, and we’re certainly decades away from a floating Thor’s hammer circling the planet. But if kinetic energy projectiles do find efficient applications in warfare, it’s possible they could find new delivery systems for battlefield destruction — with potentially devastating effects that might eclipse the MOAB as the most violent non-nuclear weapon in the Pentagon’s arsenal.

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