Welcome to the October 11, 2017, Edition of THE REVENGE HUMP DAY!

I'm still fighting my chest infection and it is really pissing me off. SHE WHO MUST BE OBEYED has said that I am going to have to stay at home until I get better instead of going to Con*Stellation next weekend. I am going to miss everybody in Huntsville more than you can imagine.

I am still watching the NFL protests that are going on. I totally agree that the players have the RIGHT to protest, but they have a responsibility to their fans who go to NFL games to be entertained. Also it is my belief that they don't have the right to disrespect the National Anthem and the men and women who have lost their lives defending it over the years. If they want to protest, then they can do it outside of the Stadiums and not in the face of the fans. Who by they way seem to agree with me. The NFL ratings are plunging at a rate never before approached and fans are not watching in droves.

I noticed that Vice-President Pence got up and walked out of the Colts game when 20 members of the the opposing team refused to stand for the National Anthem. The left wing media is labeling this as a stunt. Well, the man has a son who is a US Marine and on deployment. More power to him and Mrs. Pence for standing up for his beliefs.

The country is still reeling from the tragedy in Las Vegas at the Mandalay Bay. It shows how much damage a crazy man can cause in this world who puts his mind to it. I have been listening to a large number of politicians believe that there was not much they can could do to stop this disaster. But those on the left want to put more gun control laws on us. My question is for what reason? The guy could have plowed into the crowd with a tractor trailer rig that probably would have killed more people like in France. Guns are just machines that have been around for many hundreds of years and are not going away in the United States. Every time I hear liberals complaining that the 2nd amendment is obsolete I never hear how they would try to amend our constitution. They want to 'get around it' by the impingement on our constitutional freedoms with rules and regulations. I wish I could understand this train of thought from those on the left.

So on that "introspective 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

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Re. the Las Vegas massacre, let's conduct a thought experiment.

From: "Frank Brayman" afranklin3@gmail.com

After WW-II, the British Army discarded their WW-I era bolt-action (manual operation) Short Lee-Enfield rifles. Hundreds of thousands of them were imported and sold here. In my youth, any place that sold guns had them, or you could buy one by mail order. They were cheap - work 8 hours at minimum wage, and you could have one. Most were butchered into low-end deer rifles. These days, those deer rifles are "grandpa guns", and they're in attics and closets all over America. Or go into any gun shop, and you'll likely find at least one on

the used-gun rack, very reasonably priced. They're not on anybody's gun control radar except the worst anti-gun extremists.

A few have survived in original military configuration - they're WW-I collectibles now. I've owned several, manufactured 1911-1918. They were intended to deliver rapid aimed fire in the hands of a trained soldier - the British training standard was 20 rounds per minute. They achieved that using magazine chargers, speed-loading devices that hold multiple cartridges. The technique wasn't new even then - it was developed in Germany (of course!) in the 1880s.

I once did a living-history WW-I firepower demo. From a knee rest, I put 20 rounds into a 20-inch square at 200 yards, and did it in 30 seconds. That's not tack-driving accuracy, but it's the size of the kill zone on a human torso. Close enough for government work. Firing at a mass target, as British infantry did in August 1914, a sustained rate of 30+ rounds per minute isn't out of the question. The German troops on the receiving end thought the British had large numbers of machine guns, when in fact a British battalion (roughly 1000 men) had just two.

Where am I going with this? The Vegas gunman could have bought an Enfield deer gun for less than 1/3 the price of an AR-15. Ammunition is readily available, and it's much more powerful than either AR-15 or AK-47 ammo. Magazine chargers are available on the internet. There's plenty of open desert in the region to practice in. Could he have killed 59 people with just one rifle like this? Don't bet against it.

Now: Convince me that a ban on AR-15 and AK-47 rifles would prevent this sort of atrocity.

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It is my understanding that the British forces used to practice the 'Mad Minute' in where a soldier would practice firing 20 aimed and fired rounds with a Lee-Enfield Bolt Action Rifle. And they were quite good with it. That is aimed fire and not spray and pray. VT

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RE: Gun Control

From: "Pam Adams" pamcrippenadams@gmail.com

This was an act of terrorism that couldn't have been solved by a 'good guy with a gun,' unless that good guy was a sniper.

I think there are ways to better control firearms, but we also need better ways to find and control the people who will do this kind of evil, whether with guns, bombs, or any other means of destruction.

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RE: Gun Control

From: "lbauer30" lbauer30@comcast.net

The left and the media, but I repeat myself, keep pitching the idea that gun crime is on the rise when in fact it is at record lows in spite of the rare but terrible events such as occurred in Las Vegas. Look past the statistics thrown at you, dig deeper and you'll see how they cherry pick certain numbers or demographics to create an artificial perception counter to established fact.

Keep in mind that Great Britain has the draconian gun control that is the ultimate aim of our most fanatic anti gun crowd. Great Britain also has a violent crime rate five times greater than what we experience here in the United States according to official UN statistics.

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Re: Constitution

From: "Jim Woosley" jimwoosley@aol.com

The Constitution does not grant the right of self-defense; it acknowledges that the right to self-defense is implicit and intrinsic in natural law.

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Gun meme - The Puckle gun

The Puckle gun (also known as the Defence gun) was a primitive crew-served , manually-operated flintlock [1] revolver patented in 1718 by James Puckle (1667?1724) a British inventor, lawyer and writer. It was one of the earliest weapons to be referred to as a

"machine gun", being called such in a 1722 shipping manifest, [2] though its operation does not match the modern use of the term.

The Puckle gun is a tripod-mounted, single-barreled flintlock weapon fitted with a manually operated [3] revolving cylinder; Puckle advertised its main application as an anti-boarding gun for use on ships. The barrel was 3 feet (0.91 m) long with a bore of 1.25 inches (32 mm). The cylinder held 6 to 11 shots depending on configuration, and was hand-loaded with powder and shot while detached from the weapon. [i] [4]

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Gun Smiths are very inventive people and will always find away around mechanical difficulties. First it was the bi-barrell pistol. Then it was the pepper box pistol. And all of this was before the Constitution. So what is normal? UT

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From: "Mike Waldrip" waldripk@gmail.com

LEXOPHILE

Lexophile" is a word used to describe those that have a love for words, such as "you can tune a piano, but you can't tuna fish", or "to write with a broken pencil is pointless." A competition to see who can come up with the best lexophiles is held every year in an undisclosed location. Here are this year's 2017 winning submissions:

When fish are in schools, they sometimes take debate.
...
A thief who stole a calendar got twelve months....

When the smoglifts in Los Angeles U.C.L.A....

The batteries were given out free of charge...

A dentist and a manicurist married. They fought tooth and nail....

A will is a dead give away....

With her marriage, she got a new name and a dress....

A boiled egg is hard to beat....

When you've seen one shopping center you've seen a mall. ..

Police were summoned to a daycare center where a three-year-old was resisting a rest....

Did you hear about the fellow whose entire left side was cut off? He's all right now....

A bicycle can't stand alone;it's just two tired....

When a clock is hungry it goes back four seconds....

The guy who fell onto an upholstery machine is now fully recovered....

He had a photographic memory which was never developed....

When she saw her first strands of grey hair she thought she'd dye....

Acupuncture is a jab well done. That's the point of it. And finally:...

Those who get too big for their britches will be totally exposed in the end.

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Tim Bolgeo" tbolgeo@epbfi.com

POLISH CATHOLICS PRAY AT BORDERS 'TO SAVE COUNTRY'

AFP, 07 October 2017
http://www.france24.com/en/20171007-polish-catholics-pray-borders-save-country

inShare, © AFP | Thousands of Polish Catholics held hands along the country's borders

KODE? (POLAND) (AFP) –

Thousands of Polish Catholics formed human chains on the country's borders Saturday, begging God "to save Poland and the world" in an event many viewed as a spiritual weapon against the "Islamisation" of Europe.
Passer
Reciting "Rosary to the Borders", they called to be protected from the dangers facing them. The episcopate insisted that it was a purely religious initiative.

The goal was to have as many prayer points as possible along Poland's 3,511-kilometre (2,200-mile) border with Germany, the Czech Republic, Slovakia, Ukraine, Belarus, Lithuania, Russia and the Baltic Sea.

Fishing boats joined the event on the sea, while kayaks and sailboats formed chains on Polish rivers, local media said.

During a mass, broadcast live by the ultra-Catholic Radio Maryja, Krakow archbishop Marek Jedraszewski called on believers to pray "for the other European nations to make them understand it is necessary to return to Christian roots so that Europe would remain Europe."

Archbishop Stanislaw Gadecki, head of the Polish Episcopal Conference, told the commercial radio station RMF FM that "the key objective of this manifestation is to pray for peace."

The date was not chosen at random. October 7 is when Catholics celebrate the Feast of Our Lady of the Rosary, marking the 1571 victory of Christianity over the Ottoman Turks at the Battle of Lepanto.

A victory attributed to the recital of the rosary "that saved Europe from Islamisation", the Solo Dios Basta foundation, organising the event, said on its website.

Many Poles see Islam as a threat. The conservative government, which enjoys the backing of a sizeable portion of the population, refuses to welcome migrants to Poland, which has very few Muslims of its own.

Nationalist Catholic activist Marcin Dybowski told AFP before the event that "a religious war between Christianity and Islam is once again underway in Europe, just like in the past."

"Poland is in danger. We need to shield our families, our homes, our country from all kinds of threats, including the de-Christianisation of our society, which the EU's liberals want to impose on us," he said.

Twenty-two border dioceses have taken part in the event, with their faithful congregating in some 200 churches for a lecture and mass before travelling to the border to say the rosary.

The prayers were also said at the chapels of several international airports. Polish parishes abroad said they would join the event too.

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AFTER PLAYERS KNEEL, PENCE TURNS THE TABLES

Fox News Staff, 10/08/2017
http://americanactionnews.com/articles/after-players-kneel-pence-turns-the-tables

By Gonzo fan2007 (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons

Vice President Mike Pence walked out on his home-state Indianapolis Colts Sunday when members of the opposing team kneeled for the national anthem, but a report that Colin

Kaepernick, the player who started it all, will stand if given another shot in the NFL was quickly dialed back.

"I left today's Colts game because @POTUS and I will not dignify any event that disrespects our soldiers, our Flag, or our National Anthem," Pence tweeted.

Several San Francisco 49ers players kneeled for the anthem on Sunday in Indianapolis.

Read more at http://americanactionnews.com/articles/after-players-kneel-pence-turns-the-tables#04QvVwiKQdV3v2cv.99

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

BREAKING: NFL GETS BRUTAL NEWS… LOWEST THEY'VE EVER BEEN

BY K. CAMPBELL, ON OCTOBER 9, 2017 AT 2:02PM
https://conservativetribune.com/breaking-nfl-brutal-news/?utm_source=Email&utm_medium=newsletter&utm_campaign=dailypm&utm_content=conservative-tribune

When the NFL became a platform for liberals to push their agenda, fans warned that they wouldn't support it. Well, it seems that warning has come to fruition if a recent poll is any indication.

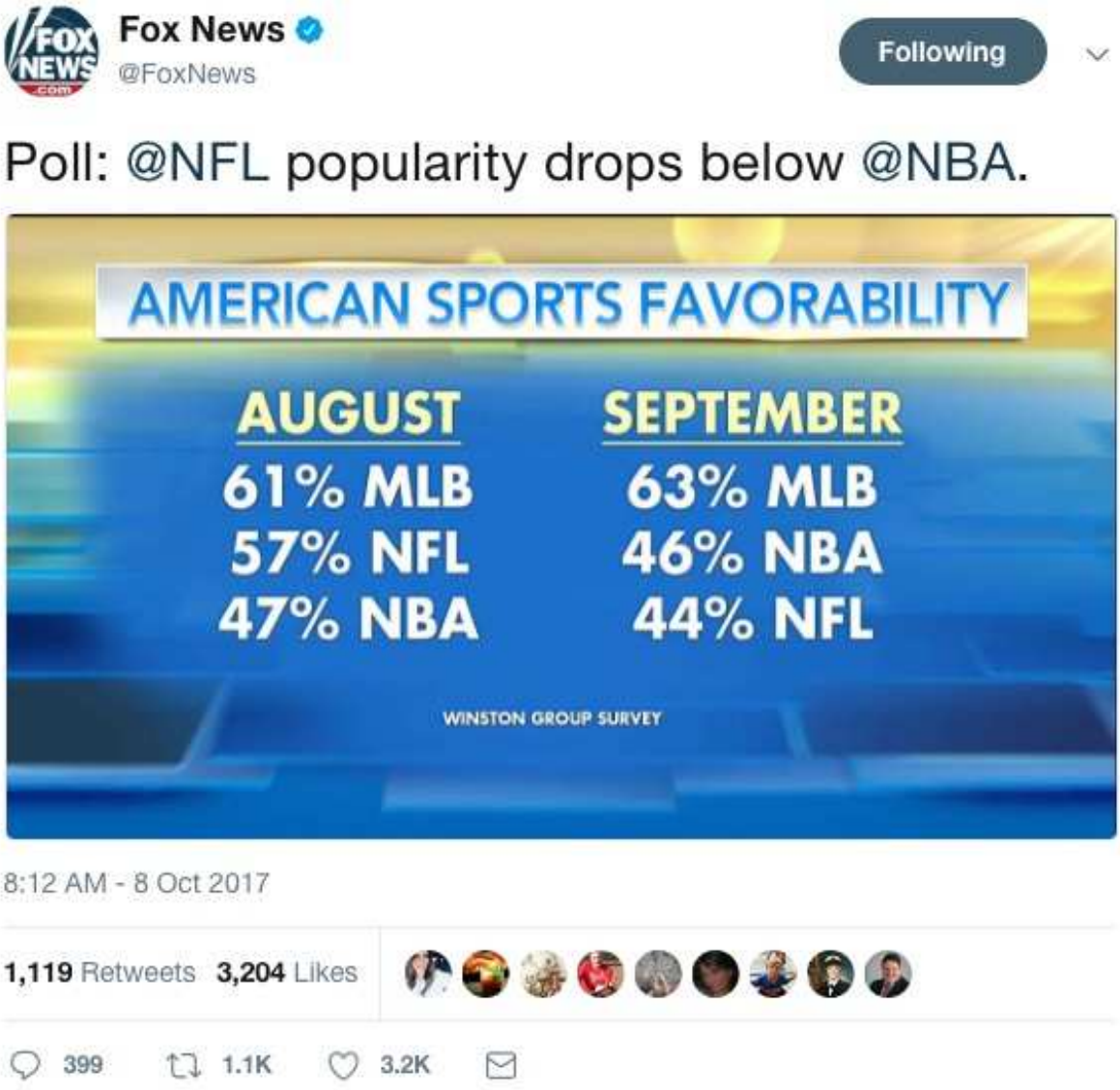
The professional football league, which once enjoyed high ratings, was ranked the least popular among professional and collegiate sports leagues, the Winston Poll found, according to the Washington Examiner.

From the end of August to the end of September, the NFL's favorability ratings dropped from 57 percent to 44 percent, and it also had the highest unfavorable rating — 40 percent — of any big-name sport.

Every category of NFL fan saw a drop in support, the poll reported, but one of the more telling declines in favorability came from the league's core fans — men aged 34-54 — showing that the NFL has become out of touch with its base.

In fact, within this specific group of fans, NFL favorables fell 31 percent, from 73 to 42. When broadened to all males surveyed, the results were still a dismal 45 percent.

The poll includes brand images for the NFL, Major League Baseball, the National Basketball Association, and college football and basketball. It surveyed 1,000 registered voters in late August and then again in late September.



In August, professional baseball had the highest favorables, just four percentage points above the NFL, but a mere month later, that number had increased to 19 percentage points.

The decrease for the NFL likely can be attributed to the hundreds of players who have refused to stand for the playing of the national anthem before games in protest of perceived racial injustice.

Countless fans have uploaded videos, pictures and posts to social media explaining that they would no longer be supporting the NFL, even teams they had cheered for their entire lives. Many went so far as to burn the jerseys and other memorabilia of teams and athletes who once held their respect. We all tried to warn the NFL that liberalism destroys everything it touches, but they just wouldn't listen.

Are you glad the NFL has dropped to the nation's least popular sports brand? Like and share this article on Facebook and Twitter and let us know.

How, if at all, can the NFL get back its favorable ratings? Scroll down to comment below!

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: A Friend

WYOMING MAN ARRESTED AFTER CLAIMING HE TRAVELED FROM 2048 TO WARN OF ALIEN INVASION

http://www.foxnews.com/us/2017/10/04/wyoming-man-arrested-after-claiming-traveled-from-2048-to-warn-alien-invasion.html

Bryant Johnson, of Wyoming, was arrested Monday night for public intoxication after claiming he traveled from 2048 to warn of an alien invasion. (Casper Police Department)

Whatever a Wyoming man was drinking was out of this world.

Bryant Johnson was arrested for public intoxication on Monday night after he allegedly told police that he came from the future to warn of an alien invasion.

Police were called to a street in Casper where Johnson reportedly told them he traveled from the year 2048 and was trying to warn the town that aliens would be arriving next year, KCWY reported.

Johnson said that everyone needed to leave as quickly as possible and demanded to speak to the president of the town, KCWY said.

He reportedly told law enforcement that he was able to travel back to 2017 – even though, he said, he meant to travel to 2018 – because aliens filled his body with alcohol and had him stand on a giant pad to transport him to the past.

The alien informant allegedly smelled of alcohol, had watery and bloodshot eyes and slurred his speech, police noted.

Johnson had a blood alcohol content (BAC) of .136.

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Chris Cowan" cowanc1028@earthlink.net

TWITTER WAR BETWEEN NATURAL HISTORY AND SCIENCE MUSEUMS

https://www.indy100.com/article/twitter-war-natural-history-science-museum-funny-social-media-7949936?utm_source=indy&utm_medium=top5&utm_campaign=i100

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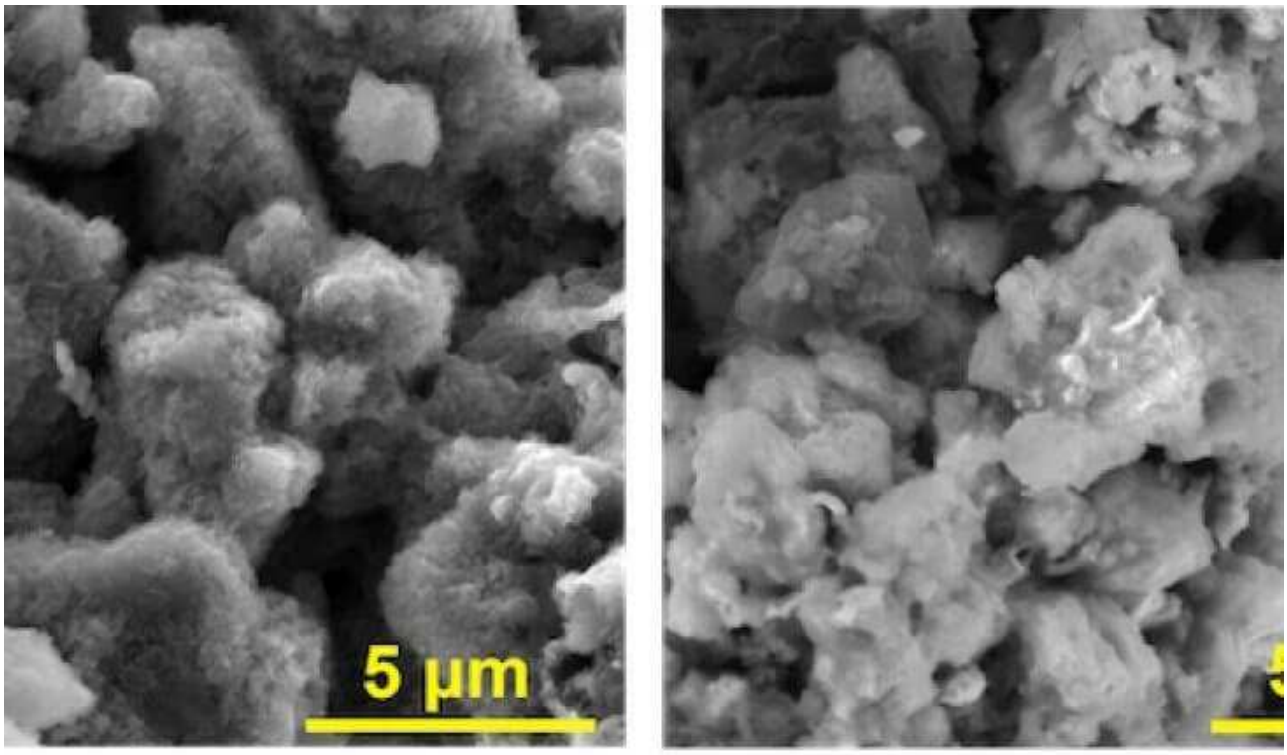
From: "Tim Bolgeo" tbolgeo@epbfi.com

RICE UNIVERSITY ADDS A BIT OF ASPHALT TO SPEED LITHIUM METAL BATTERY CHARGING BY 20 TIMES

brian wang | October 3, 2017
https://www.nextbigfuture.com/2017/10/rice-university-adds-a-bit-of-asphalt-to-speed-lithium-metal-battery-charging-by-20-times.html



A touch of asphalt may be the secret to high-capacity lithium metal batteries that charge 10 to 20 times faster than commercial lithium-ion batteries, according to Rice University scientists.

The Rice lab of chemist James Tour developed anodes comprising porous carbon made from asphalt that showed exceptional stability after more than 500 charge-discharge cycles. A high-current density of 20 milliamps per square centimeter demonstrated the material's promise for use in rapid charge and discharge devices that require high-power density.

Above image -Scanning electron microscope images show an anode of asphalt, graphene nanoribbons and lithium at left and the same material without lithium at right. The material was developed at Rice University and shows promise for high-capacity lithium batteries that charge 20 times faster than commercial lithium-ion batteries. Courtesy of the Tour Group

"The capacity of these batteries is enormous, but what is equally remarkable is that we can bring them from zero charge to full charge in five minutes, rather than the typical two hours or more needed with other batteries," Tour said.

The Tour lab previously used a derivative of asphalt — specifically, untreated gilsonite, the same type used for the battery — to capture greenhouse gases from natural gas. This time, the researchers mixed asphalt with conductive graphene nanoribbons and coated the composite with lithium metal through electrochemical deposition.

The lab combined the anode with a sulfurized-carbon cathode to make full batteries for testing. The batteries showed a high-power density of 1,322 watts per kilogram and high-energy density of 943 watt-hours per kilogram.

Testing revealed another significant benefit: The carbon mitigated the formation of lithium dendrites. These mossy deposits invade a battery's electrolyte. If they extend far enough, they short-circuit the anode and cathode and can cause the battery to fail, catch fire or explode. But the asphalt-derived carbon prevents any dendrite formation.

An earlier project by the lab found that an anode of graphene and carbon nanotubes also prevented the formation of dendrites. Tour said the new composite is simpler.

"While the capacity between the former and this new battery is similar, approaching the theoretical limit of lithium metal, the new asphalt-derived carbon can take up more lithium metal per unit area, and it is much simpler and cheaper to make," he said. "There is no chemical vapor deposition step, no e-beam deposition step and no need to grow nanotubes from graphene, so manufacturing is greatly simplified."

ACS NANO – ULTRAFAST CHARGING HIGH CAPACITY ASPHALT–LITHIUM METAL BATTERIES

Li metal has been considered an outstanding candidate for anode materials in Li-ion batteries (LIBs) due to its exceedingly high specific capacity and extremely low electrochemical potential, but addressing the problem of Li dendrite formation has remained a challenge for its practical rechargeable applications. In this work, we used a porous carbon material made from asphalt (Asp), specifically untreated gilsonite, as an inexpensive host material for Li plating. The ultrahigh surface area of over 3000 m2/g (by BET, N2) of the porous carbon ensures that Li was deposited on the surface of the Asp particles, as determined by scanning electron microscopy, to form Asp–Li. Graphene nanoribbons (GNRs) were added to enhance the conductivity of the host material at high current densities, to produce Asp–GNR–Li. Asp–GNR–Li has demonstrated remarkable rate performance from 5 A/gLi (1.3C) to 40 A/gLi (10.4C) with Coulombic efficiencies >96%. Stable cycling was achieved for more than 500 cycles at 5 A/gLi, and the areal capacity reached up to 9.4 mAh/cm2 at a highest discharging/charging rate of 20 mA/cm2 that was 10× faster than that of typical LIBs, suggesting use in ultrafast charging systems. Full batteries were also built combining the Asp–GNR–Li anodes with a sulfurized carbon cathode that possessed both high power density (1322 W/kg) and high energy density (943 Wh/kg).

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JAPAN MINES SEABED GETS ZINC EQUAL TO JAPAN' ANNUAL CONSUMPTION

brian wang | October 3, 2017 |
https://www.nextbigfuture.com/2017/10/japan-mines-seabed-gets-zinc-equal-to-japan-annual-consumption.html

Japan has successfully tapped into a deposit of mineral resources from a deep-water seabed off the coast of Okinawa, the economy ministry said, the largest such extraction of its type.

It is the first time metals have been mined from the seabed in such quantities using ship-based extraction technology, according to the Economy, Trade and Industry Ministry and Japan Oil, Gas and Metals National Corp.

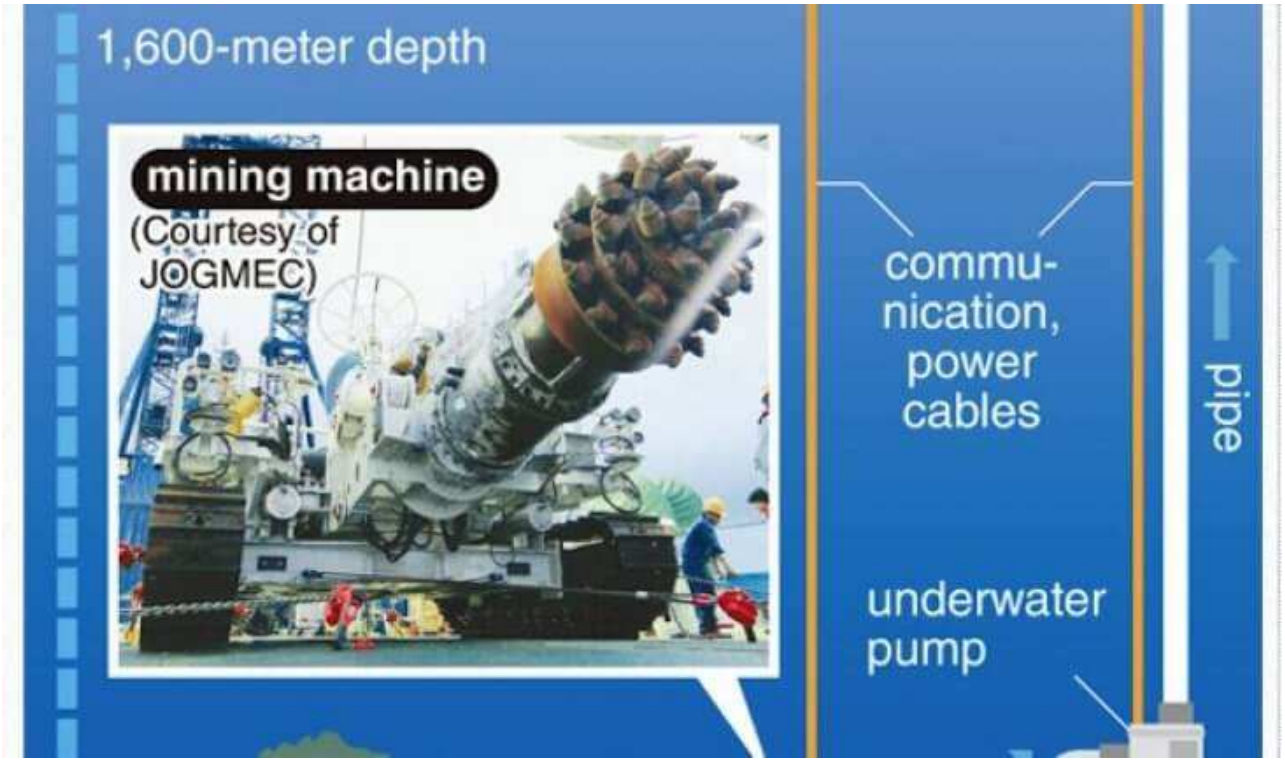
The effort was undertaken after a series of recent discoveries of ore deposits off the coast of Okinawa, according to the ministry.

From mid-August through late this month, JOGMEC deployed excavators to access the ore deposit at a depth of about 1,600 meters, sucking mineral ore up to the sea surface.

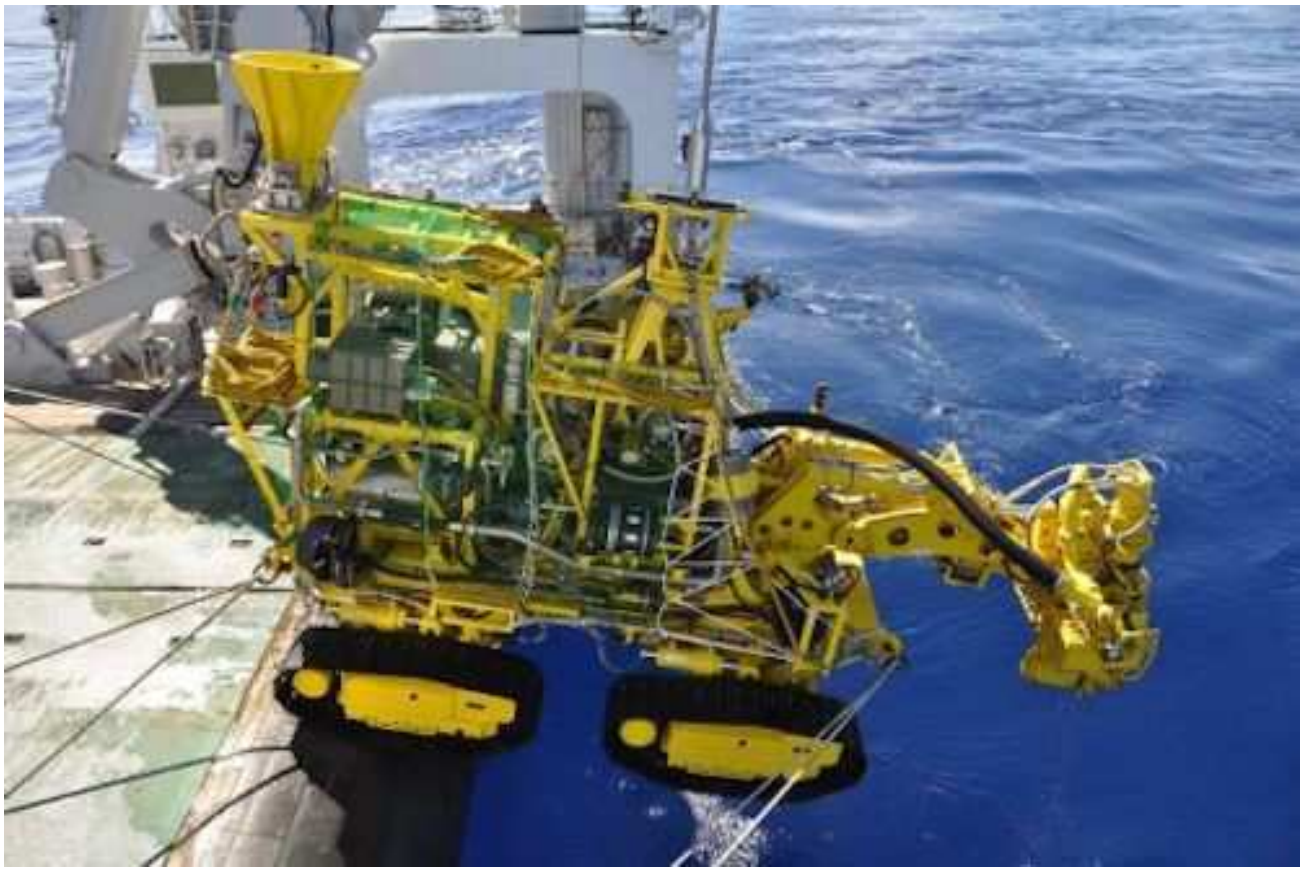
The ministry believes the mined deposit includes an amount of zinc equivalent to Japan's annual consumption. The ore deposit also includes gold, copper and lead.

Six ore deposits have been found in the past three years in waters around the southwestern island prefecture of Okinawa, all within Japan's exclusive economic zone.

The ministry expects more ore deposits to be found in the area and is planning to commercialize mining at those sites around the middle of 2020 following an economic evaluation scheduled to be conducted in fiscal 2018, from next April.



Japan relies heavily on mineral imports. After establishing a highly efficient means of extraction, the country "could possibly become a resource-producing nation if abundant quantities of deposits were confirmed," the ministry said.



The deposits, known as hydrothermal minerals, are formed when material-laden water leaches out of rock in the Earth's crust before being heated by magma and expelled out of the sea floor.

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ELON MUSK READY TO BET IT ALL ON BFR

Iconoclastic SpaceX CEO wants to scrap successful Falcon rocket line to fund Mars dream

Oct 5, 2017Irene Klotz | Aviation Week & Space Technology
http://aviationweek.com/space/elon-musk-ready-bet-it-all-bfr?NL=AW-05&sfvc4enews=42&cl=article_2&utm_rid=CPEN1000003019593&utm_campaign=11951&utm_medium=email&elq2=591ac90d1d794451894f5c9fd18b0753

SpaceX founder and CEO Elon Musk says he has fixed a fatal flaw in the interplanetary space transportation system unveiled during last year's International Astronautical Congress (IAC), namely, how to pay for it.

The 46-year-old tech entrepreneur now plans to phase out his company's successful Falcon rockets and Dragon capsules in favor of a reusable, two-stage, multipurpose super-heavy-lift launcher that not only can take on the satellite delivery and station resupply flights that keep SpaceX financially viable, but also fly crews and cargo to the Moon and Mars. The system, called BFR (an acronym for big f*g rocket) also could be used for suborbital, point-to-point travel between destinations on Earth.**

"Essentially, we want to make our current vehicles redundant," Musk said during a 45-min. presentation on the final day of this year's IAC, which was held in Adelaide, Australia,Sept. 25-29. "This was really quite a profound realization that if we can build a system that cannibalizes our own products . . . then all the resources—which are quite enormous—used for Falcon 9, Heavy and Dragon can be applied to one system."

BIG BOOSTER

* **Methane-powered BFR to replace Falcon rocket, Dragon capsule fleet**
* **New superheavy-lift rocket to take over satellite-delivery, space station servicing missions**
* **Multipurpose booster also can land on Moon and Mars and fly point-to-point on Earth**
* **Lockheed Martin unveils alternative system for Mars transport**

Since its June 2010 debut, Falcon 9 rockets have flown 41 times, with two more satellite-delivery missions slated for Oct. 7 and Oct. 9. Falcon Heavy, which extends the fleet's lift capacity to low Earth orbit (LEO) from 50,265 lb. (22,800 kg) to 140,650 lb., is due to fly for the first time before the end of the year. BFR, in contrast, has a lift capacity to LEO of 330,000 lb., admittedly overkill for the communications satellites and other payloads needing rides into orbit today.

"I know at first glance this may seem ridiculous," says Musk. "But it is not. The same is true of aircraft. If you bought, say, a small, single-engine turboprop aircraft, that would be $1.5-2 million. To charter a [Boeing] 747 from California to Australia is half a million dollars, there and back. The single-engine turboprop cannot even get to Australia. So a fully reusable, giant aircraft like the 747 costs a third as much as an expendable tiny aircraft. In one case, you have to build an entire aircraft, in the other case you just have to refuel something.

"It is really crazy that we build these sophisticated rockets and then crash them every time we fly," he adds. "Often I'll be told, 'but you could get more payload if you made it expendable.' I said yes, you could also get more payload from an aircraft if you got rid of the landing gear and the flaps and just parachute out when you got to your destination. But that would be crazy, and you would sell zero aircraft. So reusability is absolutely fundamental."

Luxembourg-based SES, the first commercial satellite operator to fly on a Falcon 9, and the first customer for a previously flown booster, said it would assess BFR for future launch services, as it would any rocket. "SES's position is to constantly review the various launch systems available to it," says Martin Halliwell, SES chief technology officer. "The SpaceX Falcon 9 has proven itself in both expendable and flight-proven modes. The BFR is a completely new system with completely different levels of capability, so we will have to assess the fit once again for our requirements. I am sure that SpaceX will fully engage with SES when the time is right."

SpaceX's planed super-heavy-lift, multipurpose replacement for the Falcon rocket and Dragon capsule at the International Space Station. Credit: SpaceX Concept

With 29,135 ft.3 (825 m3) of pressurized volume for cargo and a vehicle diameter of nearly 30 ft. (9 m), BFR could be a game changer for satellite design, Musk notes. "You could send a mirror that has 10 times the surface area of the current Hubble [telescope] as a single unit—doesn't have to unfold or anything. Or you can send a large number of small satellites. You do whatever you like. You can actually also go around and, if you wanted to, collect old satellites or clean up space debris," he says.

BFR, powered by 31 methane-fueled Raptor engines, is a scaled-down design of the 42-engine Interplanetary Transit System (ITS) Musk unveiled last year. "We were really searching for . . . how [to] pay for this thing. We went through various ideas. . . . These did not pan out. But now we think we have a way to do it, which is to have a smaller vehicle—still pretty big—but one that can do everything that's needed in the greater Earth-orbit activity."

For Mars transport, BFR's cargo area would be configured into 40 cabins, each housing four to six people, with a central storage area, galley, solar storm shelter and entertainment area. Musk would like to fly two BFRs unmanned in 2022, followed by two more unmanned and two manned missions in 2024, when Earth and Mars are again favorably aligned. "The goal of these initial missions is to find the best source of water . . . and build the propellant plant," says Musk.

"We should, particularly with six ships there, have plenty of landed mass to construct the propellant depot, which will consist of a large array of solar panels—a very large array—and then everything necessary to mine and refine water and then draw the CO2 [carbon dioxide] out of the atmosphere, and then create and store deep-cryo CH4 [methane] and O2 [oxygen.]"

BFR also could play a role in NASA's post-International Space Station plan to put a small base into orbit around the Moon to support lunar surface activities and serve as a testbed for technologies needed to send humans to Mars. For lunar sorties, BFR would not need in situ propellant production.

A few hours before Musk's presentation, Lockheed Martin rolled out its design for a Moon and Mars lander, one that would stick with hydrogen for fuel, rather than methane. "The primary reason is just efficiency," although some engineering still needs to be done to figure out the best way to chill the hydrogen, says Rob Chambers, director of Lockheed's human spaceflight strategy.

Another reason for using hydrogen is the ubiquity of water. "When you start looking at orbital missions at the beginning of exploration, water is everywhere, but methane is not and carbon dioxide is not.," he says. "It's a pretty simple chemical reaction, electrolysis to produce the hydrogen and oxygen, so it leads to a pure water-based economy."

For now, Lockheed, like SpaceX, is self-funding its vehicle concept, with an eye toward competing for potential NASA commercial services contracts for deep-space cargo and supplies deliveries, a venture that also has caught the attention of Jeff Bezos's space company, Blue Origin.

"We—the human race—need all the best ideas brought forward," says Chambers. "Even the most radical ideas possible get us all out of our comfort zone and gets us thinking."

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NEW 'MOLECULAR TRAP' CLEANS MORE RADIOACTIVE WASTE FROM NUCLEAR FUEL RODS

2017-10-05 09:05:36
http://www.newswise.com/doescience/?article_id=682335&returnurl=aHR0cHM6Ly93d3cubmV3c3dpc2UuY29tL2FydGljbGVzL2xpc3Q=

Credit: WFU / Ken Bennett

Wake Forest physics professor Timo Thonhasuer talks with postdoctoral fellow Stephanie Jensen about their research on the capture of radioactive waste materials in nuclear power plants.

A new method for capturing radioactive waste from nuclear power plants is cheaper and more effective than current methods, a potential boon for the energy industry, according to new research published in the journal Nature Communications.

"Our capture method by far outperforms all current technologies and may change the landscape of energy production worldwide," said Timo Thonhauser, the Wake Forest University computational physicist on the research team.

The new molecular trap, a metal-organic framework (MOF) called MIL-101-Cr, was developed by scientists led by Jing Li at Rutgers University, analyzed by Thonhauser's lab at Wake Forest and measured by scientists in Yves Chabal's lab at the University of Texas-Dallas.

This unique MOF removes nearly all radioactive iodide from used nuclear fuel rods. Regulations in the U.S. require reprocessing plants to scrub 99.967 percent of radioactive iodides from the rods. The MIL-101-Cr MOF removes 99.979–99.984 percent.

MOFs are a relatively new class of materials in which metal corners are connected by an organic linker.

"That becomes an entire framework with empty space in the middle," Thonhauser explained. "It looks kind of like a sponge."

The breakthrough came when the researchers at Rutgers attached "grabbers" to the metal corners of their MOF, creating MIL-101-Cr, an industrial adsorbent that is very good at capturing one particular byproduct of nuclear energy production – radioactive iodide. This substance has been linked to cancer in humans.

As the research team's computational physicist, Thonhauser, with post-doctoral assistant Stephanie Jensen, ran theoretical tests of the MOF using a supercomputer. Their aim was to determine why and how the trap works so it can be improved in further testing.

In fact, this MOF is three to four times better than the current industrial adsorbent used by nuclear power plants. It's also cheaper, because it doesn't rely on a precious metal such as silver to form its corners.

That fact alone could save on fuel costs around the globe. A 2015 report by the World Nuclear Association ranked the cost of nuclear power in the U.S. lower than coal but higher than natural gas.

The research behind "Capture of organic iodides from nuclear waste by metal-organic framework-based molecular traps" is funded by a joint grant from the U.S. Department of Energy.

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SQUIRTABLE SURGICAL GLUE SEALS WOUNDS IN 60 SECONDS

Nick Lavars, October 5th, 2017
http://newatlas.com/squirtable-surgical-glue-metro/51634/

Once squirted into the wound, the MeTro glue is said to behave much like the silicone sealants used around bathroom tiles

Advanced surgical glues that seal wounds faster could mean big things when it comes to medical care, with shorter recovery times and fewer complications just a couple of potential advantages. A new material is showing particular promise in this regard, with the ability to be squirted directly into a wound, seal it in 60 seconds and dissolve thereafter.

The researchers behind the surgical glue, which is called MeTro, say that it could replace staples and sutures used by doctors to seal up wounds, but its benefits don't stop there. Because it is so fast-acting, it could be used at emergency sites, such as a car accident or a war zone, with the scientists likening its behavior once squirted into the wound to silicone sealants used around bathroom tiles.

"The beauty of the MeTro formulation is that, as soon as it comes in contact with tissue surfaces, it solidifies into a gel-like phase without running away," said Assistant Professor Nasim Annabi from Northeastern University, who worked with other researchers in the US and Australia's University of Sydney in developing MeTro.

The gel-like glue mixes natural, highly elastic proteins with light-sensitive molecules that enable it to set in 60 seconds when exposed to UV light. This UV-treatment cures the glue and allows it to form tight bonds with structures on the surface of the tissue, which maintains its elasticity. Also included is a degrading enzyme that can be manipulated to determine how long the glue lasts in the wound, ranging from hours to months, depending on the time it needs to heal.

Because of the glue's high elasticity, it could be suitable for treating wounds in tissues that expand and relax and are therefore at risk of re-opening, like the lungs or heart. The team says it could also prove valuable in treating internal wounds in places where bodily fluids ruin the effectiveness of more conventional sealants.

Annabi was the lead author of the new study putting MeTro through its paces, where the team quickly and successfully closed wounds in rodent arteries and lungs, along with the lungs of pigs. Buoyed by the results, he and the team are now shifting their focus towards human trials.

"MeTro seems to remain stable over the period that wounds need to heal in demanding mechanical conditions and later it degrades without any signs of toxicity, it checks off all the boxes of a highly versatile and efficient surgical sealant with potential also beyond pulmonary and vascular suture and staple-less applications," says Harvard Medical School Professor Ali Khademhosseini, who helped develop MeTro.

The team has published their results in the journal Science Translational Medicine, while the video below provides an overview of how MeTro works.

Source: University of Sydney

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"HAPPY CHEMICAL" DISCOVERED IN BEER?

By Neuroskeptic | October 7, 2017 6:15 am
http://blogs.discovermagazine.com/neuroskeptic/2017/10/07/happy-chemical-beer/#.WdkF8GiPJPY

A curious flurry of headlines in praise of beer appeared this week:

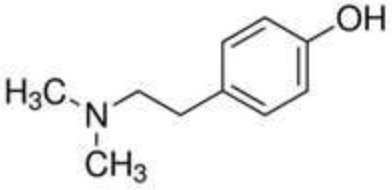
*** Beer really DOES make you happier! Key molecule boosts brain's reward centre**

*** Drinking Beer Makes You Really Happy, Confirms Awesome New Study**

*** Drinking beer can make you happy, researchers claim**

It was reported that scientists from Germany have discovered that a molecule in beer called hordenine activates dopamine receptors in the brain, and thus produces a positive mood.

The research in question was published back in March of this year, so I'm not sure why it only made the headlines this week – maybe Oktoberfest had something to do with it. Either way, the study did indeed find that hordenine is a dopamine D2 receptor agonist, but it's not clear this has any relevance to beer drinkers.



The German researchers, Sommer et al., are chemists, not neuroscientists. They used computational simulations to model whether 13,000 known 'food-derived' molecules would bind to the D2 receptor. The hordenine molecule was predicted to fit the receptor, and follow-up experiments showed that it does indeed bind to it, suggesting possible psychoactive properties.

But Sommer et al. didn't study whether hordenine actually exists in beer in sufficient amounts to have any effect. They didn't consider whether it can even reach the brain after oral consumption. According to Wikipedia, some animal studies have shown that hordenine is "not orally active", although it does have effects when injected.

Overall, Sommer et al. were engaging in pure speculation when they wrote that

Based on its presence in beer, we suggest that hordenine significantly contributes to mood-elevating effects of beer.

So I'm pretty sure that there is only one molecule in beer that makes you happy. This is the same molecule that can make you unhappy. So let's raise a glass to ethanol, the real star of beer.

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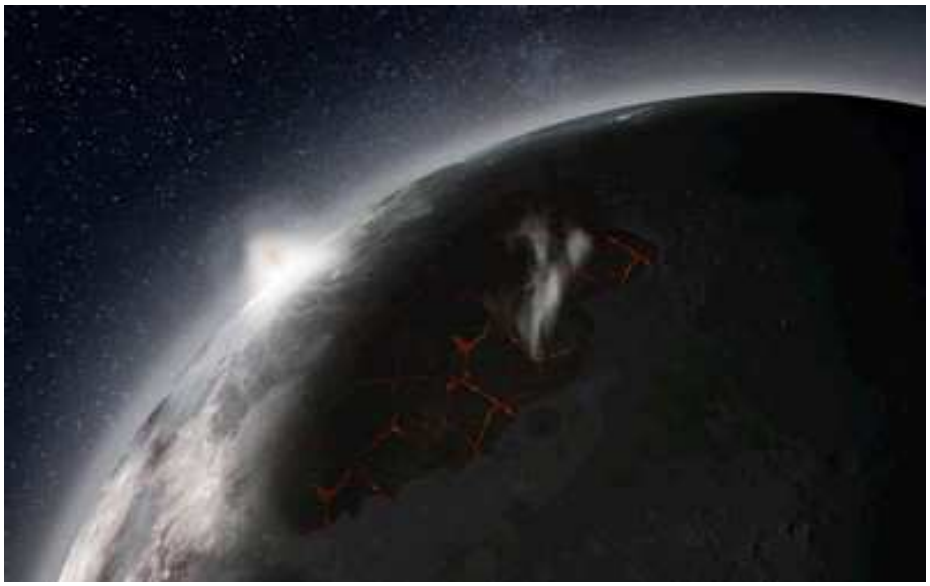
THE MOON ONCE HAD AN ATMOSPHERE?

By Nathaniel Scharping | October 6, 2017 10:43 am
http://blogs.discovermagazine.com/d-brief/2017/10/06/moon-atmosphere/#.WdkGvGiPJPY



An artist's conception of the ancient moon with lava venting gases into a thin atmosphere. (Credit: NASA MSFC)

Barren and desolate today, our moon was once swathed by a thin atmosphere.

Born from geothermal eruptions when the moon was still young, gaseous traces of carbon monoxide, sulfur, hydrogen and oxygen once swirled across the moon's surface, say researchers from NASA. The atmosphere would have persisted for about 70 million years, they estimate, and existed three to four billion years ago, soon after our rocky companion was formed.

The new findings, published in Earth and Planetary Science Letters, come from analyses of large lava flows on the moon's surface called maria, paired with samples of moon rocks from the Apollo missions. This gave the researchers an idea of what kind of volatile gasses would have been escaping from the lava, and examining the volume of the lava flows indicated how much would have been present.

Given the amount of solidified lava present, they estimate that the atmosphere would have exerted at its maximum a pressure of around 1 kilopascal, or around 50 percent higher than Mars' atmosphere today. That's still thin compared to the Earth, however, at sea level the pressure is just over 100 kilopascals. Over time, the moon's weak gravity was unable to hold on to the gases, and they were lost to space.

It's not totally accurate to say the moon has no atmosphere today, as there are scarce traces of gas flying around, created as photons and particles from the solar wind impact rocks on the surface, as well as from meteor impacts. But don't expect to feel the caress of the lunar wind, as its atmosphere is roughly equivalent to what's found near the International Space Station in orbit around the Earth. The Apollo 17 mission captured some

of these particles, and found helium and argon, as well as potential traces of other elements on the moon.

Even the ancient atmosphere was far too thin for anything to survive there, but the researchers say traces of those gassier days may remain at the moon's poles. In permanently shadowed regions there, water ice could exist, locked in place for billions of years following its emergence from beneath the moon's surface. Such reserves could be an important resource for future astronauts or inhabitants on the moon.

The atmosphere could have also fueled chemical reactions with the surface rocks, offering an explanation for the presence of magnetite in lunar rocks brought back to Earth, a mineral that requires concentrations of oxygen not normally found on the moon.

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WHAT'S IN A NAME? SPACEX'S 'BFR' MARS ROCKET ACRONYM EXPLAINED

By Mike Wall, Space.com Senior Writer | October 7, 2017 07:00am ET
https://www.space.com/38393-spacex-bfr-mars-colony-rocket-name.html

Artist's illustration of SpaceX BFR spaceships on the Martian surface. Credit: SpaceX

You don't have to lie when talking to your kids about SpaceX's BFR Mars-colonization architecture.

Yes, BFR stands for "Big F---ing Rocket." But there's also a family-friendly variant of the acronym, and it's coming into wider and wider use — as evidenced by SpaceX President Gwynne Shotwell's remarks Thursday (Oct. 5) at the first meeting of the newly resurrected National Space Council.

"Last week, Elon announced — or, basically, gave an update on — the Big Falcon Rocket program, Big Falcon Rocket and Big Falcon Spaceship," Shotwell said, referring to SpaceX founder and CEO Elon Musk's Sept. 29 presentation at the International Astronautical Congress (IAC) in Adelaide, Australia. [

The BFR transportation system consists of a giant, 31-engine rocket topped by a spaceship capable of carrying 100 people or more. Both of these vehicles will be fully and rapidly reusable, helping to make Mars colonization economically feasible, Musk said during his IAC talk.

SpaceX has already started serious development work on the BFR, and the company aims to launch the first uncrewed Mars missions with it in 2022, Musk said. If everything goes well, crewed BFR flights to the Red Planet could follow in 2024, he added.

Musk first revealed the basics of SpaceX's Mars-settlement architecture at the 2016 IAC meeting, which was held in Guadalajara, Mexico. During that presentation, the billionaire entrepreneur called the rocket-spaceship combo the Interplanetary Transport System.

With the shift to BFR, SpaceX appears to be going back to the system's nomenclatural roots; the term has been in use internally at the company for several years, as a December 2015 GQ story makes clear.

"This is a very obtuse video-game reference," Musk told GQ. "In the original Doom, the gun that was like the crazy gun was the BFG 9000 or something like that. So it was sort of named after the gun in Doom. But that's not its official name, of course."

This anecdote suggests that "Big F---ing Rocket" was the original phrase for the BFR acronym. But "Big Falcon Rocket" isn't exactly an awkward fit: The big booster slots nicely into SpaceX's Falcon family, which also includes the company's first orbital rocket, the now-retired Falcon 1; the workhorse Falcon 9; and the Falcon Heavy, whose maiden flight is scheduled to take place next month.

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AVIATION PARTNERS SETS WORLD RECORD – WITHOUT WINGLETS

Oct 10, 2017John Morris | ShowNews
http://aviationweek.com/nbaa-2017/aviation-partners-sets-world-record-without-winglets?NL=AW-021&Issue=AW-021_20171009_AW-021_656&sfvc4enews=42&cl=article_5&utm_rid=CPEN1000001477803&utm_campaign=12072&utm_medium=email&elq2=526d93b1733c4010916bf3d48b70c2c1

Famous for its advanced-technology winglets, Aviation Partners, Inc. helped drive Steve Hinton Jr. and his highly modified P-51 Mustang to a new world record without them.

"I came through the trap at 100 ft. and 560 mph," says pilot Steve Hinton, showing the potential of the famous racing P-51 "Voodoo." That was to be the best it could show as an ailing engine trimmed average speed over four timed runs to 531.53 mph – but enough to make Hinton the fastest piston-engine pilot on the planet.

Steve Hinton Jr. believes "Voodoo" can go even faster.

That's not the first world record for API (Booth C8110). It began with Blended Winglets for the Gulfstream II in the early 1990s, with which aviator Clay Lacy knocked two hours off the Los Angeles to Paris world speed record in a Blended Winglet-equipped Gulfstream II (or IISP) in 1995. The next year, Lacy established seven new time-to-climb records in the IISP, including a dramatic climb from sea level to 40,000 ft (12,000 m) in just six minutes and 20 seconds.

API now provides performance-enhancing winglets for thousands of airliners and business jets. Each development serves to further the company's expertise in aerodynamics and its computational fluid dynamics modeling programs. So when Hinton asked API cofounder Joe Clark two years ago if he would sponsor Voodoo and his world speed attempt, Clark replied, "Let me think about it."

He did, and he told Hinton API would be interested only if it could add value. The result? It redesigned the wing, Clark told ShowNews.

"We were not interested in just sponsoring," Clark said. "So we laser shot the wing to get the exact shape. You know it was designed over 75 years ago! Then we used our most sophisticated computational fluid dynamics models. We noticed some very strong shock waves in around Mach 0.75 to 0.80, so we redesigned the aerodynamics and moved the shock wave aft to delay the rise in drag and allow the P-51 to achieve higher speeds."

Instead of building a new wing, API designed panels to attach to the surface to change the airfoil. They actually made the wing thicker, by almost 2.5 inches at the trailing edge where they met the flaps.

Clark said API learned "a couple of secrets" from the exercise where the envelope could be pushed a little more, but they're going to stay secret for now. So are details of two or three new advanced winglets API is working on for commercial airliners, though he let slip that development is under way on radical split-spiroid winglets. API is also looking at load alleviation as a way to add winglets without the need for so much additional structure in the wing.

WHY NO WINGLETS ON 'VOODOO'

Winglets bring more efficiency in high-speed cruise. They reduce the drag of a wing by effectively increasing both its span and its aspect ratio. Voodoo doesn't care about fuel economy and owes its performance to the philosophy of brute force where minimum wing (with drag reduced by clipping it 2.5 ft. from standard) plus maximum horsepower (3,100 hp) equals maximum speed.

MEET THE PLANET'S FASTEST PISTON PILOT

Steve Hinton Jr., who last month broke the world speed record for piston-engine propeller aircraft, is here every day at Aviation Partners, Inc. (Booth C8110), whose aerodynamic expertise made the victory possible.

"They did a lot of work that was actually quite revolutionary in that with all these racers and high-performance aircraft no one has actually changed the airfoil before," Hinton told ShowNews. "It looked pretty radical!

"A lot of people in the industry were a bit skeptical because it has never been done before. But API was able to apply its CFD tools to the airfoil. I was really surprised that the wing acted just like they said it would," Hinton said.

"We essentially moved the thickest portion of the airfoil back on the wing to reduce the shockwave. You would think a real thin wing would go the fastest.

"They did their research and were able to apply this modern technology to something 75 years old and find that happy medium where it didn't affect the airplane poorly. It only increased the top speed. It's really nice!"

GAME-CHANGING YANMAR 50 HP TURBO DIESEL OUTBOARD MOTOR BEGINS PRODUCTION

Mike Hanlon, October 10, 2017
http://newatlas.com/yanmar-dtorque-111-turbo-diesel-50hp-outboard/51675/

Compared to petrol outboards, the Yanmar is lighter, smoother, more compact, has double the engine life, and offers much better fuel consumption and running costs. It produces less toxic emissions, has more torque much lower in the rev range and that's before you consider the safety and ready availability of diesel fuel.(Credit: Yanmar/Neander-Motor)

Diesel has traditionally always been the fuel of the maritime industry, which makes the absence of a viable widely-distributed diesel outboard engine even more puzzling. Production of the 50 hp Yanmar Dtorque 111 turbo-diesel has begun and the world's first viable diesel outboard engine is on the market at last.

Yes, there have been precedents, most notably by Yanmar itself, but they are no longer produced and certainly not like this engine. The benefits of the unconventional new German-designed Neander-Shark enginecompared to traditional petrol-burning outboard engines now seem overwhelming.

The Yanmar Dtorque 111 is lighter and more compact than petrol engines of similar capacity, has double the engine life, is much smoother, offers much better fuel consumption and running costs, produces significantly less toxic emissions, and with more torque much lower in the rev range, will thrust a boat onto the plane much quicker ... and that's before you consider the safety and ready availability of diesel fuel.

Pioneering non-traditional technology in any marketplace is fraught with peril, but it is a path that Germany's Neander Motors, based in the Baltic port of Kiel, has been forced to take in several markets, thanks to its two-conrods-per-piston, small-capacity diesel engines.

The benefits of the engine design are many, most significantly that the two-counter-rotating crankshafts offer perfect primary balance of the engine and a smoothness normally

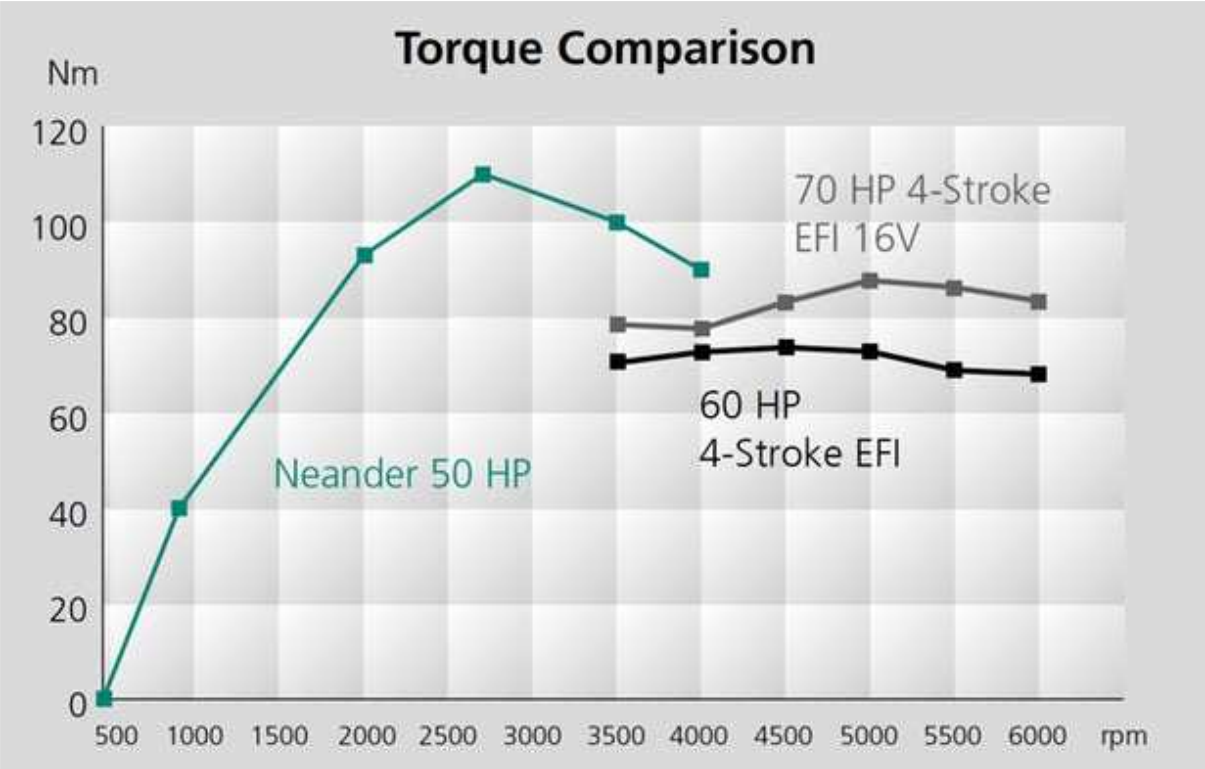
associated with six-cylinder petrol engines, not two-cylinder engines of any type, and particularly not diesel engines. With a lack of vibration inherent in the design, a Neander engine does not need the weighty vibration-absorbing robustness of a traditional diesel.

The announcement at the Monaco Yacht Show that Yanmar would begin global distribution of the Dtorque 111 outboard engines is a triumph for the Neander company and its long path to commercialization. The outboards will be produced by Austria's Steyr Motors.

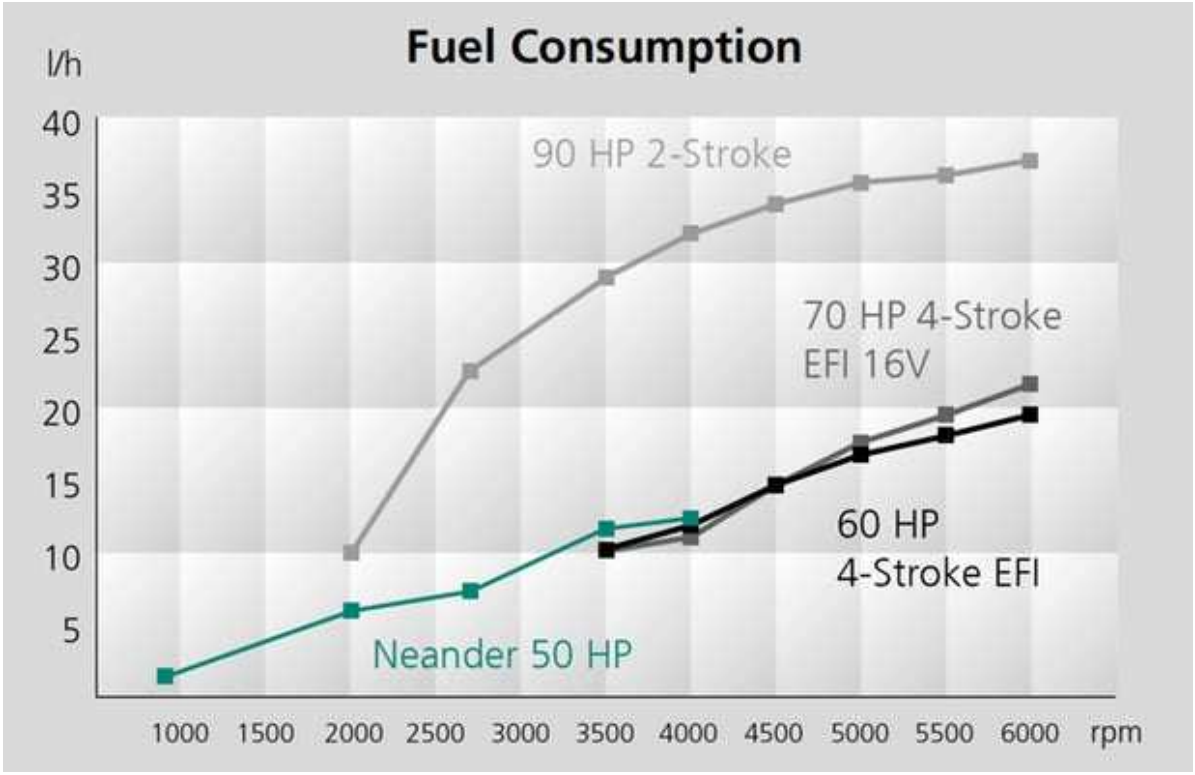
We first became aware of Neander-Motors more than a decade ago when its highly unorthodox diesel engine was demonstrated in a motorcycle.

Sadly, the benefits of the design were lost among the eccentricities of the motorcycle marketplace where small unconventional manufacturers are plentiful. Now that the engine's primary virtues have been recognised and commercialised on a grand scale by Yanmar's global distribution, the Neander 1400cc turbocharged twin cylinder diesel might make a comeback too.

The compact Dtorque 111 will be a boon to the small workboat market where it's expected lifespan of well over 10,000 hours at least doubles that of any comparable outboard gasoline engine.



The Dtorque 111 is named for its remarkable low rpm torque, with 111 Nm on offer at 2,500 rpm. That's the type of grunt that will immediately fling a medium-sized boat onto the plane, offering a far different experience than a high revving traditional four-stroke.



As the world's smallest diesel engine with common-rail fuel injection, the Dtorque 111 delivers impressive fuel economy and exhaust emissions that fall well within the latest EU RCD 2 limits. Even at full throttle and full loading, it typically burns less than 12 liters of fuel per hour, half the amount of gasoline outboards of similar performance. For the past 2 years both Yanmar and Neander have been trialing the pre-series production diesel outboards in six European countries, with some remarkable results.

With support from the Norrkust Marina Varvs AB in Båtskärsnä (near Luleå in Sweden), the Dtorque was tested at temperatures of minus 15 degrees Celsius at the Ymer icebreaker. In a port area, which had been freed from ice for the tests, the engine ran perfectly in all speed and load ranges, and started and idled so reliably at these icy temperatures that the Swedish coast guard directly expressed interest in the technology.

"We invited a wide cross-section of our customers around Europe to performance-test the outboards in differing sea states and loading conditions gathering as many opinions as possible," explained Floris Lettinga, Yanmar Global Sales Manager.

"Our research has confirmed that this product is ideally placed for the light duty commercial market, from wind turbine servicing and fish farming to harbor and patrol duties, water taxis and superyacht charter services. We are confident that the combination of long range, low running costs, durability and low emissions delivered by this unique diesel outboard will appeal to operators across a wide range of applications.

"With many commercial operators maintaining a single diesel fuel policy to avoid risk of fire and explosion, the market potential for the Dtorque 111 is highly diverse. So far, the main option for small workboat propulsion has been the gasoline outboard. No longer is that true!"

Power	36,8 kW/50 hp at 3.500 - 4.000 min^{-1}
Max. Torque	111 Nm at 2000 - 3000 min^{-1}
Engine Type	4-Stroke turbo diesel
Balance	Dual counter-rotation crankshafts
Swept Volume	804 ccm
Bore x Stroke	80 x 80 mm
No. Cylinders	2 In-Line, twin
Intake	Water cooled turbo charger and charge air cooling
Lubrication	Integrated dry sump – pressure lubricated
Fuel	Diesel
Injection	Bosch common rail direct injection
Starting	Electric
Alternator	Standard 12 V/300 W
Cooling	NEANDER Active Thermo-Management System (ATMS)
Exhaust	Integrated underwater thru-hub propeller
Steering	Tiller / remote control, optional
Suspension	Silent-block-controlled compression and traction
Trim	Power trim
Shift	Mechanical – dog-clutch gearing
Transmission	Ratio 13/27 (2.07:1)
Available Shaft	Versions 20" and 25"
Standard Propeller Type	3-blade with built-in damper
Weight	Basic Version 175 kg (dry)

Source: [Yanmar]

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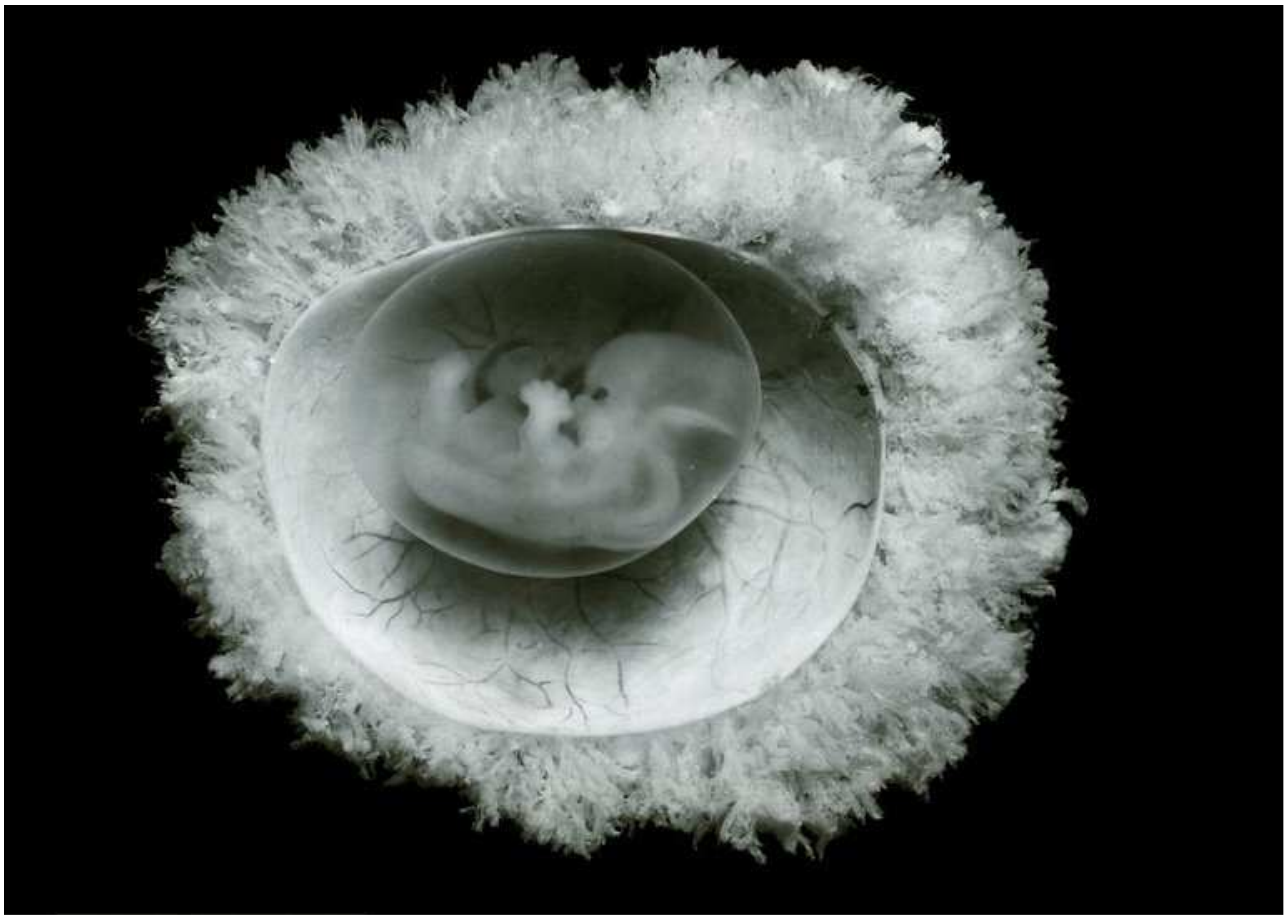
From: "Jim Woosley" jimwoosley@aol.com

ANCIENT VIRUSES ARE BURIED IN YOUR DNA

Carl Zimmer, MATTER OCT. 4, 2017
https://www.nytimes.com/2017/10/04/science/ancient-viruses-dna-genome.html



A human embryo at 45 days. Scientists have learned that a protein called Hemo, made by a fetus and the placenta, is produced from viral DNA that entered our ancestors' genomes 100 million years ago.CreditOmikron, via Science Source

In July, scientists reported that a strange protein courses through the veins of pregnant women. No one is sure what it's there for.

What makes this protein, called Hemo, so unusual is that it's not made by the mother. Instead, it is made in her fetus and in the placenta, by a gene that originally came from a virus that infected our mammalian ancestors more than 100 million years ago.

Hemo is not the only protein with such an alien origin: Our DNA contains roughly 100,000 pieces of viral DNA. Altogether, they make up about 8 percent of the human genome. And scientists are only starting to figure out what this viral DNA is doing to us.

Aris Katzourakis, a virologist at the University of Oxford, and his colleagues recently published a commentary in the journal Trends in Microbiology in which they explored the possibility that viral genes that produce proteins like Hemo are affecting our health in a variety of unexpected ways.

Some of our ancient viruses may be protecting us from disease; others may be raising our risks for cancer, among other conditions. "It's not an either-or — are these things good or bad? It's a lot more complicated than that," Dr. Katzourakis said in an interview. "We're barely at the beginning of this research."

Most of our viral DNA comes from one group in particular: retroviruses, a group that includes HIV.

A retrovirus invades a host cell and inserts its genes into that cell's DNA. These viral genes co-opt the cell's machinery, using it to make new viruses that escape to infect more cells.

If a retrovirus happens to infect an egg or sperm, its DNA can potentially be passed to the next generation and the generation after that. Once retroviruses become inherited stowaways, scientists refer to them as endogenous retroviruses.

At first, endogenous retroviruses coax cells to make more retroviruses that can infect other cells. But over the generations, the viral DNA mutates, and endogenous retroviruses eventually lose the ability to infect new cells.

Even after being hobbled, these endogenous retroviruses can still sometimes make their proteins. And they can also reproduce, after a fashion. They can force cells to make copies of their DNA, which are inserted back in the cell's own genome.

After a single infection, an endogenous retrovirus may build up hundreds of copies of itself in its host's DNA.

Some endogenous retroviruses are unique to humans, but others are found in a variety of species. In January, Dr. Katzourakis was a co-author on a study showing that one retrovirus common in mammals also is present in fish like cod and tuna. Retroviruses, that study indicated, were invading our marine ancestors 450 million years ago — or even earlier.

Just as we have defenses against free-living viruses, we have also developed defenses against endogenous retroviruses. Our cells can coat their DNA with molecules that suppress viral genes, for example.

But sometimes these viral genes manage to switch on anyway. In many kinds of tumor cells, for instance, scientists find proteins produced by endogenous retroviruses. That discovery has fueled a long-running debate: Do endogenous retroviruses help cause cancer?

Recent studies suggest they can. A team of French researchers engineered healthy human cells to make a viral protein found in many tumors and watched the cells grow in a petri dish.

The protein caused the cells to behave in some suspiciously cancer-like ways. They changed shape, as cancer cells do, becoming long and skinny. And they also started to move across the dish.

In addition, the viral protein caused the cells to switch on other genes that have been linked to cancer.

But John M. Coffin, a virologist at Tufts University, suspects there's less to these viral proteins than meets the eyes. He speculates that in many cases, cancer cells make viral proteins only because they are switching on genes willy-nilly — both human and viral genes alike.

"Our starting position is that this is largely a chance event," Dr. Coffin said.

But in certain cases, Dr. Coffin said, we have domesticated our viruses. We make proteins from endogenous retroviruses to carry out functions we depend on. Some endogenous retroviruses offer protection against other viruses, for example.

And some viral proteins are important for reproduction. Placentas make viral proteins, and scientists have found that some types, known as syncytins, fuse together placental cells, a crucial step in fetal development.

"My speculation is that without syncytins, mammal evolution would have looked very different," Dr. Coffin said.

Five years ago, the French biologist Odile Heidmann and her colleagues went on a search for more endogenous retroviruses in the human genome.

Dr. Heidmann, who works at Gutave Roussy, a cancer research institute in Paris, discovered a stretch of viral DNA that had gone overlooked. She and her colleagues named it Hemo.

Dr. Heidmann was surprised to find versions of Hemo in other species. Among primates, the gene that makes this protein has barely changed over the ages.

Its consistency across many species shows that the gene and its protein must have an important job to do: "It isn't simply a relic," Dr. Heidmann said. Mutations to Hemo must have been harmful or even fatal to the unfortunate animals who had them.

The placenta produces Hemo, and so do cells in the early embryo itself. But so far Dr. Heidmann and her colleagues have not been able to figure out why.

"It's very, very old, so it has to do something," she said. It's possible, she said, that Hemo proteins are a message from fetus to mother, dampening the mother's immune system so that it doesn't attack the fetus.

But there are other possibilities, too.

The early embryo is a hotbed of activity for endogenous retroviruses, recent studies have shown. To understand why embryonic cells make viral proteins, scientists have run experiments to see what happens when viral genes are silenced.

These experiments suggest that viral proteins help the embryo develop a variety of tissues.

Early on, the cells in an embryo can turn into any tissue. As these stem cells divide, they can lose this flexibility, committing to becoming one kind of cell or another. After that, cells typically shut down their viral genes.

Viral proteins appear to help keep stem cells from losing this potential. And Gkikas Magiorkinis of the University of Athens has speculated that this feature might have a sinister origin.

Viruses might have exploited embryos to make more copies of themselves. By keeping their hosts as stem cells for longer, the viruses were able to invade more parts of the embryo's body.

"When the host grows, it will have copies in the retrovirus in most of its cells," Dr. Magiorkinis said.

This strategy may do more than create more viruses. Stem cells can produce eggs and sperm in embryos. The viruses may be raising their odds of getting into the next generation.

In other words, early embryos may have come to depend on the tricks viruses use to manipulate them. "We're exploiting a property that has evolved for the virus's benefit," Dr. Katzourakis said.
