

June 8, 2015

The next Nobel Medicine prizes will go to researchers at The University of Virginia. **Huffington Post** tells us about the stunning discovery of vessels that connect the brain to the lymphatic system.

Neuroscientists have uncovered a previously unknown direct connection between the brain and the immune system -- a finding that could have significant implications for the treatment of brain disorders like Alzheimer's disease, multiple sclerosis and autism.

The discovery came as a surprise to Dr. Kevin Lee, chairman of the University of Virginia's neuroscience department.

"The first time these guys showed me the basic result, I just said one sentence: 'They'll have to change the textbooks,'" Lee said in a press release Monday.

The study's lead author, Dr. Jonathan Kipnis of the University of Virginia's Center for Brain Immunology and Glia, echoed the sentiment.

"When we discovered the lymphatic vessels we were very very surprised, because based on the textbooks -- these vessels do not exist," Kipnis said in an email to The Huffington Post. ...

... A next step of the research is to determine how the vessels might be involved in diseases involving the brain and the immune system, such as multiple sclerosis and Alzheimer's.

"We believe that for every neurological disease that has an immune component to it, these vessels may play a major role," Kipnis said.

Though the findings are preliminary, the researchers hope they'll open up a number of new possibilities for treating these and other neurological disorders through therapies that target the lymphatic vessels of the brain.

For example, Kipnis explained that the findings could shed light on why large protein chunks accumulate in the brains of Alzheimer's patients. "We think they may be accumulating in the brain because they're not being efficiently removed by these vessels," he said. ...

More from **Machines Like Us**.

That such vessels could have escaped detection when the lymphatic system has been so thoroughly mapped throughout the body is surprising on its own, but the true significance of the discovery lies in the effects it could have on the study and treatment of neurological diseases ranging from autism to Alzheimer's disease to multiple sclerosis.

"Instead of asking, 'How do we study the immune response of the brain?,' 'Why do multiple sclerosis patients have the immune attacks?,' now we can approach this mechanistically -- because the brain is like every other tissue connected to the peripheral immune system through meningeal lymphatic vessels," said Jonathan Kipnis, a professor in U.Va.'s Department of Neuroscience and director of U.Va.'s Center for Brain Immunology and Glia. "It changes entirely

the way we perceive the neuro-immune interaction. We always perceived it before as something esoteric that can't be studied. But now we can ask mechanistic questions."

He added, "We believe that for every neurological disease that has an immune component to it, these vessels may play a major role. [It's] hard to imagine that these vessels would not be involved in a [neurological] disease with an immune component."

The desire of humans to trade has many ancient markers. [Science20.com](#) reports on gold trade between Ireland and the Cornish coast as many as 2,500 years BCE. That would mean a sea voyage of over 150 miles across unfriendly waters. *Archaeologists have found evidence of an ancient gold trade route between the south-west of the UK and Ireland, which would mean people were trading gold between the two countries as far back as the early Bronze Age, 2500 B.C.*

The finding was made after measuring the chemical composition of early gold artifacts in Ireland and discovering that the objects were actually made from imported gold, rather than Irish. The gold is most likely to have come from Cornwall, which means the symbiotic link between Ireland and England is even farther back than believed. ...

[Smithsonian](#) has interesting trips for your bucket list. They list five sites where large meteors have hit the earth and rearranged the landscape.

Early in the morning of October 6, 2008, astronomers at the University of Arizona detected an asteroid on a collision course with Earth. When other sightings cropped up across the world, the astronomers' suspicions were confirmed—the asteroid was going to hit our planet. It was the first time in history an asteroid had been observed before impact. Within hours, the asteroid entered the Earth's atmosphere (and thus became a meteor) and broke up into tiny pieces. These fragments—known as meteorites—landed in a remote location in northern Sudan.

Luckily for Earth, this meteor wasn't the big one that NASA scientists are warning could one day crash into our planet (and that Bruce Willis once blew up in a movie). But throughout history, meteorites have left their beautiful—if destructive—scars upon the globe. Here are some of the best places to see meteorite impact sites this summer: ...

The cartoonists have some fun with Caitlyn Jenner.

Huffington Post

[Landmark Study Finds Previously Unknown Link Between The Brain And Immune System](#)

by Carolyn Gregoire

Neuroscientists have uncovered a previously unknown [direct connection](#) between the brain and the immune system -- a finding that could have significant implications for the treatment of brain disorders like Alzheimer's disease, multiple sclerosis and autism.

The discovery came as a surprise to Dr. Kevin Lee, chairman of the University of Virginia's neuroscience department.

"The first time these guys showed me the basic result, I just said one sentence: 'They'll have to change the textbooks,'" Lee said in [a press release](#) Monday.

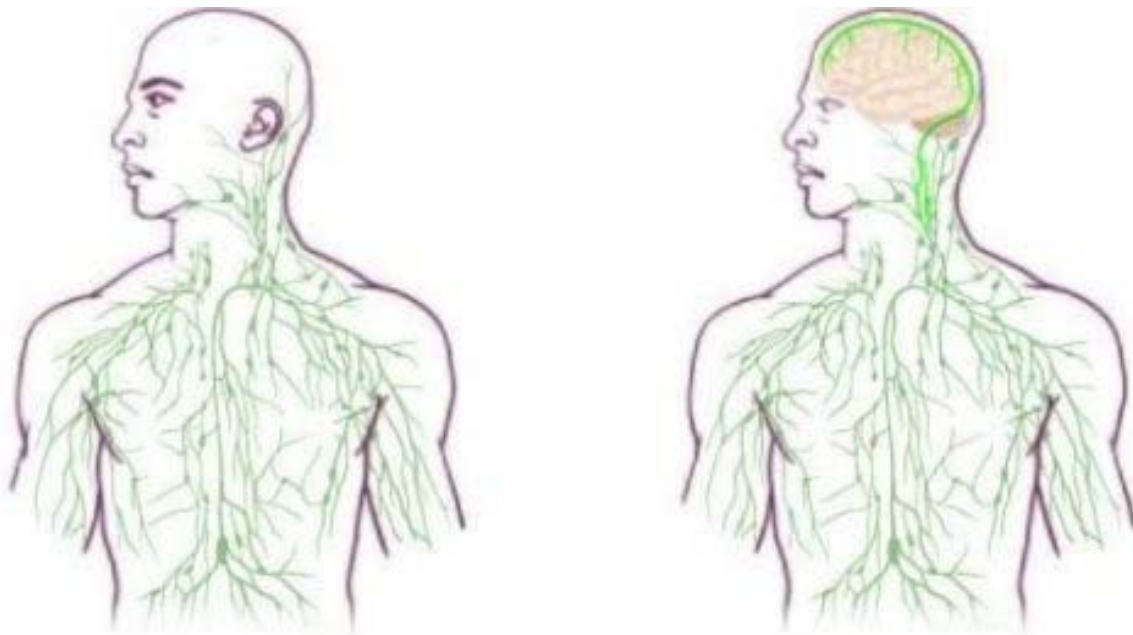
The study's lead author, Dr. Jonathan Kipnis of the University of Virginia's Center for Brain Immunology and Glia, echoed the sentiment.

"When we discovered the lymphatic vessels we were very very surprised, because based on the textbooks -- these vessels do not exist," Kipnis said in an email to The Huffington Post.

A direct connection. While previous research held that there was no direct connection between the brain and the lymphatic system, the new findings, [which were recently published in the journal Nature](#), present a model of the lymphatic system that includes the brain.

Though not a part of the immune system, the lymphatic system carries lymph, a clear fluid filled with white blood cells that helps remove toxins from the body. The lymphatic system is connected to every other system in the body, and was believed to end at the base of the skull.

But the researchers noticed something strange while looking through their microscopes at slides containing the membranes of mice's brains. They saw lymphatic vessels, which had never before been observed above the base of the skull.



UVA Health System

An old map of the lymphatic system (left), and a new map updated to reflect the discovery of the brain's lymphatic vessels (right).

Why have they never been observed before? Kipnis explained that the vessels are "well hidden" behind a major blood vessel to the sinuses in an area of the brain that's difficult for scientists to image.

While the observation was made in mice, the same anatomy is believed to exist in humans as well.

New questions. A next step of the research is to determine how the vessels might be involved in diseases involving the brain and the immune system, such as multiple sclerosis and Alzheimer's.

"We believe that for every neurological disease that has an immune component to it, these vessels may play a major role," Kipnis said.

Though the findings are preliminary, the researchers hope they'll open up a number of new possibilities for treating these and other neurological disorders through therapies that target the lymphatic vessels of the brain.

For example, Kipnis explained that the findings could shed light on why large protein chunks accumulate in the brains of Alzheimer's patients. "We think they may be accumulating in the brain because they're not being efficiently removed by these vessels," he said.

Other members of the scientific community have expressed excitement about the discovery, while cautioning that the findings have not yet been replicated or confirmed.

"With further research, the findings could help scientists to target inflammation in the brain, which is a factor in many neurological conditions," James Nicoll, professor of neuropathology at the University of Southampton in England, [told The Guardian](#).

Machines Like Us

Stunning link found between brain and immune system

by Eric Swensen

In a stunning discovery that overturns decades of textbook teaching, researchers at the University of Virginia [School of Medicine](#) have determined that the brain is directly connected to the immune system by vessels previously thought not to exist.

That such vessels could have escaped detection when the lymphatic system has been so thoroughly mapped throughout the body is surprising on its own, but the true significance of the discovery lies in the effects it could have on the study and treatment of neurological diseases ranging from autism to Alzheimer's disease to multiple sclerosis.

"Instead of asking, 'How do we study the immune response of the brain?', 'Why do multiple sclerosis patients have the immune attacks?', now we can approach this mechanistically – because the brain is like every other tissue connected to the peripheral immune system through meningeal lymphatic vessels," said Jonathan Kipnis, a professor in U.Va.'s [Department of Neuroscience](#) and director of U.Va.'s [Center for Brain Immunology and Glia](#). "It changes entirely the way we perceive the neuro-immune interaction. We always perceived it before as something esoteric that can't be studied. But now we can ask mechanistic questions."

He added, “We believe that for every neurological disease that has an immune component to it, these vessels may play a major role. [It’s] hard to imagine that these vessels would not be involved in a [neurological] disease with an immune component.”

Kevin Lee, who chairs the Department of Neuroscience, described his reaction to the discovery by Kipnis’ lab: “The first time these guys showed me the basic result, I just said one sentence: ‘They’ll have to change the textbooks.’ There has never been a lymphatic system for the central nervous system, and it was very clear from that first singular observation – and they’ve done many studies since then to bolster the finding – that it will fundamentally change the way people look at the central nervous system’s relationship with the immune system.”

Even Kipnis was skeptical initially. “I really did not believe there are structures in the body that we are not aware of. I thought the body was mapped,” he said. “I thought that these discoveries ended somewhere around the middle of the last century. But apparently they have not.”

The discovery was made possible by the work of Antoine Louveau, a postdoctoral fellow in Kipnis’ lab. The vessels were detected after Louveau developed a method to mount a mouse’s meninges – the membranes covering the brain – on a single slide so that they could be examined as a whole. “It was fairly easy, actually,” he said. “There was one trick: We fixed the meninges within the skullcap, so that the tissue is secured in its physiological condition, and then we dissected it. If we had done it the other way around, it wouldn’t have worked.”

After noticing vessel-like patterns in the distribution of immune cells on his slides, he tested for lymphatic vessels and there they were. The impossible existed.

The soft-spoken Louveau recalled the moment: “I called Jony [Kipnis] to the microscope and I said, ‘I think we have something.’”

As to how the brain’s lymphatic vessels managed to escape notice all this time, Kipnis described them as “very well hidden” and noted that they follow a major blood vessel down into the sinuses, an area difficult to image. “It’s so close to the blood vessel, you just miss it,” he said. “If you don’t know what you’re after, you just miss it.

“Live imaging of these vessels was crucial to demonstrate their function, and it would not be possible without collaboration with Tajie Harris,” Kipnis noted. Harris is an assistant professor of neuroscience and a member of the Center for Brain Immunology and Glia. Kipnis also saluted the “phenomenal” surgical skills of Igor Smirnov, a research associate in the Kipnis lab whose work was critical to the imaging success of the study.

The unexpected presence of the lymphatic vessels raises a tremendous number of questions that now need answers, both about the workings of the brain and the diseases that plague it.

For example, take Alzheimer’s disease. “In Alzheimer’s, there are accumulations of big protein chunks in the brain,” Kipnis said. “We think they may be accumulating in the brain because they’re not being efficiently removed by these vessels.” He noted that the vessels look different with age, so the role they play in aging is another avenue to explore.

And there’s an enormous array of other neurological diseases, from autism to multiple sclerosis, that must be reconsidered in light of the presence of something science insisted did not exist.

The findings have been published online by the prestigious journal *Nature* and will appear in a forthcoming print edition. The article’s authors are Louveau, Smirnov, Timothy J. Keyes, Jacob

D. Eccles, Sherin J. Rouhani, J. David Peske, Noel C. Derecki, David Castle, James W. Mandell, Lee, Harris and Kipnis.

The study was funded by National Institutes of Health grants R01AG034113 and R01NS061973. Louveau was a fellow of Fondation pour la Recherche Medicale.

Science20.com

Prehistoric Gold Trade Route Discovered

Archaeologists have found evidence of an ancient gold trade route between the south-west of the UK and Ireland, which would mean people were trading gold between the two countries as far back as the early Bronze Age, 2500 B.C.

The finding was made after measuring the chemical composition of early gold artifacts in Ireland and discovering that the objects were actually made from imported gold, rather than Irish. The gold is most likely to have come from Cornwall, which means the symbiotic link between Ireland and England is even farther back then believed.



Lunula and discs. Credit National Museum of Ireland

"This is an unexpected and particularly interesting result as it suggests that Bronze Age gold workers in Ireland were making artefacts out of material sourced from outside of the country, despite the existence of a number of easily-accessible and rich gold deposits found locally," says Lead author Dr Chris Standish. "It is unlikely that knowledge of how to extract gold didn't exist in Ireland, as we see large scale exploitation of other metals. It is more probable that an 'exotic' origin was cherished as a key property of gold and was an important reason behind why it was imported for production."

The researchers used an advanced technique called laser ablation mass spectrometry to sample gold from 50 early Bronze Age artefacts in the collections of the National Museum of Ireland, such as; basket ornaments, discs and lunula (necklaces). They measured isotopes of lead in tiny fragments and made a comparison with the composition of gold deposits found in a variety of locations. After further analysis, the archaeologists concluded that the gold in the objects most likely originates from Cornwall, rather than Ireland - possibly extracted and traded as part of the tin mining industry.

Dr Standish says: "Perhaps what is most interesting is that during this time, compared to Ireland, there appears to be much less gold circulating in Cornwall and southern Britain. This implies gold was leaving the region because those who found it felt it was of more value to trade it in for other 'desirable' goods - rather than keep it."

Today, gold is intrinsically linked with economic wealth, is universally exchangeable and underpins currencies and economies across much of the globe. However, gold may not always have had this value - in some societies, gold was seen to embody supernatural or magical powers, playing a major role in belief systems rather than economic ones. The value and significance placed on gold may have varied from region to region.

Dr Alistair Pike, a co-author from the University of Southampton, adds: "The results of this study are a fascinating finding. They show that there was no universal value of gold, at least until perhaps the first gold coins started to appear nearly two thousand years later. Prehistoric economies were driven by factors more complex than the trade of commodities - belief systems clearly played a major role."

Smithsonian Magazine

Big Boom: The Best Places to See Meteorite Impact Craters

Ancient impacts changed landscapes and perhaps even the course of evolution—here's where to see the coolest craters this summer

by Matt Blitz

Early in the morning of October 6, 2008, astronomers at the University of Arizona [detected an asteroid on a collision course with Earth](#). When other sightings cropped up across the world, the astronomers' suspicions were confirmed—the asteroid was going to hit our planet. It was the [first time in history](#) an asteroid had been observed before impact. Within hours, the asteroid entered the Earth's atmosphere (and thus became a [meteor](#)) and broke up into tiny pieces. These fragments—known as [meteorites](#)—landed in a remote location in northern Sudan.

Luckily for Earth, this meteor wasn't [the big one that NASA scientists are warning could one day crash into our planet](#) (and that [Bruce Willis once blew up in a movie](#)). But throughout history, meteorites have left their beautiful—if destructive—scars upon the globe. Here are some of the best places to see meteorite impact sites this summer:

Kaali Meteorite Crater Field: Saaremaa Island, Estonia



[About 7,500 hundred years ago](#), a meteor entered the Earth's atmosphere and broke apart into nine pieces over present-day Saaremaa Island in Estonia. Our pre-historic ancestors must have gone into a wild panic watching these giant rocks fall from the sky—when the pieces hit the ground, they caused [a combined impact comparable to an atomic bomb](#). Given [the densely populated area where the meteorites fell](#), the casualties were likely severe.

All nine impact sites, now called the Kaali Meteorite Crater Field, can still be visited today, and come [complete with a museum, gift shop and hotel](#). Several are relatively small (one measures 36 feet across and just over three feet deep), but the largest is over 360 feet and now filled with water. Archeologists believe this crater may have been [the site for ancient cult activities, including animal sacrifices](#).

Barringer Meteorite Crater: Arizona



Right around the [dawn of the human species](#), a massive, rocky fireball broke through the Earth's atmosphere and crash-landed into what is now northern Arizona, igniting an explosion with [the force of 2.5 million pounds of dynamite](#). The fireball hit the Earth so hard, most of the meteorite vaporized upon impact.

About 50,000 years later, in 1902, mining mogul Daniel Barringer Jr. staked a claim to what was then called Canyon Diablo Crater. Barringer's claim was based on his theory that a meteorite full of iron ore had caused the massive indentation in the desert; until Barringer, it was widely believed that an explosion of steam made the crater. The high levels of iron and the position of the rock strata provided evidence that a high-velocity asteroid was indeed the cause of the crater, but only after geologist [George P. Merrill](#) championed his theory was it accepted by geologists worldwide. Soon, the crater was renamed in Barringer's honor.

Today, the crater [is still owned by the Barringer family](#), who say it is the "the world's best-preserved meteorite impact site." Located near Winslow and right off of Interstate-40, [the complex has a museum, movie theater and its own gift shop](#).

Vredefort Crater: South Africa



Over 2 billion years ago, a meteorite [six miles in diameter and moving at the rate of 12.5 miles per second](#) struck Earth about 75 miles southwest from present-day Johannesburg, South Africa. The impact of the meteorite was [almost twice as big as the one that wiped out the dinosaurs](#). While algae was likely the only life existing on the planet before the impact, the event [caused immense evolutionary and geological changes](#). To this day, it is thought to be [the single greatest release of energy](#) our planet has ever seen.

The Vredefort Dome is one of Earth's largest and oldest [astroblemes](#) (the scar or deformation left by an ancient, high-impact meteorite strike). The crater gets its name from the dome-shaped feature that was created when the blast pushed the rock up and out. Declared [a World Heritage Site in 2005](#), it is promoted as a [tourist attraction](#) and a place for adventure-seekers, although some [issues have arisen with the upkeep and management of the site](#).

Middlesboro Crater: Kentucky



The 10,000-person town of Middleboro, Kentucky was once known as [the gateway to the West](#). More recently, it's been confirmed as a 200-million-year-old meteorite crater.

In 2003, scientists from the Kentucky Geological Survey concluded [that a meteorite over 1,500 feet in diameter](#) crashed into Earth sometime around [the Permian and Triassic periods](#). The impact created a crater about [four miles wide, with rock slopes reaching up 1,900 feet](#). While erosion and vegetation obscured the crater for millions of years, the shape and position of the valley told geologists that this was, in fact, an ancient impact site.

"Middleboro is in this strangely rounded valley in the middle of Appalachia. You don't get round valleys here. It's not normal," [geologist William Andrews told the Tuscaloosa News in 2003](#). This natural distinction has allowed Middleboro to declare itself the "[only American town built inside of a meteorite crater](#)."

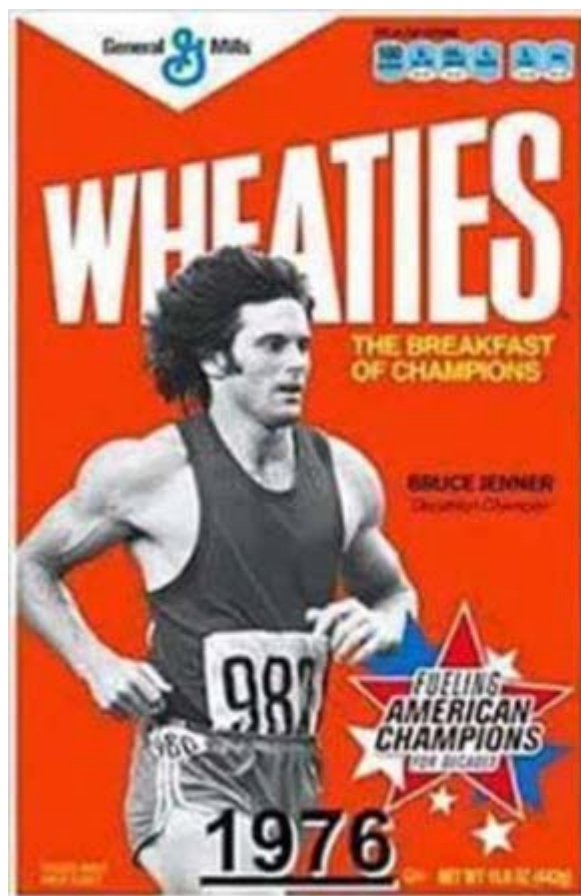
Wolf Creek Meteor Crater: Australia



The 300,000-year-old Wolfe Creek Crater lies way out in the remote and desolate Western Australian outback. If it looks like it's the perfect setting for a horror movie, [well, it was](#).

[An aerial survey in 1947](#) may have revealed this massive crater (3,000 feet in diameter) to Europeans, but it had been known to Aboriginal communities in the region for centuries. The crater, which the Djaru people called “Kandimalal,” is often mentioned in their mythology, including in one tale [involving two rainbow-colored serpents](#).

Wolfe Creek Crater is the second-largest rimmed meteorite crater in the world (behind only the Barringer Meteorite Crater in Arizona) and an Australian National Park. Camping is encouraged, although visitors are warned [to avoid Australia's summer \(November to April\) due to the oppressive heat](#). The crater and park are also full of wildlife, including a large population of the very loud [Major Mitchell's cockatoos](#).



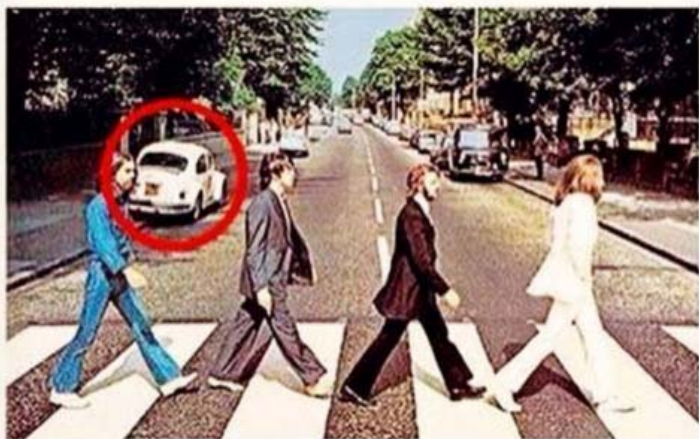




A **book**
commits
suicide
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**Behold... the one and only
true**



FIFTH BEATLE