

Science AMA Series: I'm Chris Cogswell, a PhD and host of the Mad Scientist Podcast. I am trying to promote science by talking about the history and philosophy of science and how it fits with modern/historical pseudoscientific beliefs. AMA!

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### Abstract

I'm Chris Cogswell, a PhD in Chemical Engineering and host of "The Mad Scientist Podcast", a show that discusses scientific concepts by teaching the history and philosophy of pseudoscience! I'm here to answer any questions you have about scientific outreach to the public through non-conventional means, my research background (both scientific and non-scientific), and any skeptical or weird science questions you may not normally get to ask. I received a Bachelors of Science in Chemical Engineering and Philosophy from the University of New Hampshire in the spring of 2012, where in Chemical Engineering I did research on electrochemical plating methods for computer chip design. In the realm of philosophy I did a lot of research on the conversion from science to pseudoscience, and why the public accepts some technologies while others lag behind due to political, economic, and sociological barriers. In the fall of 2012 I joined Northeastern University for my PhD studies under Dr. Sunho Choi, where I performed research on the creation of nanomaterials for a variety of applications in the realm of green chemistry and sustainability. The materials I worked on include Metal Organic Frameworks (MOFs), a class of self-assembling porous structures with extremely high surface areas and chemical activity, and lamellar (layered) silicates such as zeolites and clays. I like to tell people that MOFs are like K'nex, while the lamellar structures are like Lego. While in my PhD I realized that what was really important to me was scientific outreach to the public. I had members of my own family and friends who believed all number of wacky theories, and would argue with me constantly about them. I had also spent a lot of time with undergraduate students as a TA and then as a lab manager for our research group, as well as middle school and high school students through lab tours and outreach events. Through these teaching experiences I saw that students loved to learn about these myths and legends, and how they fit into the larger narrative of scientific history. Probably what put the final piece of the puzzle together for me was working with Dr. Lucas Landherr, aka Dante Shepard of the webcomic Surviving the World! His research group is attempting to find interesting new ways to teach STEM through art or the use of non-conventional tools. We wrote a comic together on the use of assumptions in Engineering, which has been really well received in the engineering education community, and this caused me to attempt to start up something of my own. In the final year of my PhD I started The Mad Scientist Podcast, and have been teaching science through the history of pseudoscience ever since. I'm really excited to answer any questions you have on the way technologies change over time, pseudoscientific topics, engineering, nanomaterials, doing something unconventional with your science training, and podcasting as a means of education! As long as I keep getting questions I will keep answering them, so feel free to ask whatever. You can find my show here: <https://audioboom.com/channel/themadscientistpodcast> Or on our website! <https://www.themadscientistpodcast.com/> You can find our webcomic and the work of Dr. Landherr here: <https://www.northeastern.edu/landherr/stem-comics/science-comic-assumptions/> And we are part of two podcast networks, the Dark Myths collective and Blank for non-Blank (an educational network). EDIT: Well, looks like things are wrapping up! Thanks to everyone who took the time to ask a question and read my responses. I'm on Reddit all the time on my regular account, so I'll be sure to pop in and continue answering questions as you have them! Thanks to the Mods for setting this up!

-Chris

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CHRIS\_COGSWELL [R/SCIENCE](#)

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I'm really excited to answer any questions you have on the way technologies change over time, pseudoscientific topics, engineering, nanomaterials, doing something unconventional with your science training, and podcasting as a means of education! As long as I keep getting questions I will keep answering them, so feel free to ask whatever.

You can find my show here: <https://audioboom.com/channel/themadscientistpodcast>

Or on our website! <https://www.themadscientistpodcast.com/>

You can find our webcomic and the work of Dr. Landherr here: <https://www.northeastern.edu/landherr/stem-comics/science-comic-assumptions/>

And we are part of two podcast networks, the Dark Myths collective and Blank for non-Blank (an educational network).

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Do you think science is the arbiter of reality? In short, if science cannot examine it, it cannot be real.

[Bjarki56](#)

Thanks for the question! I would say that this question really gets to the crux of the show really, or what we hope to do with the show anyways. In my opinion everything should be measurable, at least indirectly, although there are all kinds of things we cannot measure at the moment. That being said, Science is not in my opinion a tool to tell us what must exist but to tell us what does based on evidence. In the past we have had all sorts of definitions for what reality is or isn't, based on a variety of different rulebooks so to speak. And in many ways science is supposed to go against that rulebook, by not telling us what reality must be but instead observing reality and telling us what it is actually like. There are all kinds of things that we had no way of directly observing until very recently, including electrons <https://io9.gizmodo.com/the-first-image-ever-of-a-hydrogen-atoms-orbital-struct-509684901> although we had ways of indirectly measuring them. But there are all sorts of things that we experience everyday which science cannot measure, and in some peoples minds these are things that are by definition not measurable. For example (and I know this is sort of the stereotypical philosophy undergraduate answer here, although it holds a lot of merit when correctly understood) the way that we experience something such as taste, smell, color, or vision may be measurable/quantifiable in the sense that we know which atomic/chemical signals are being sent to which set of receptors in the body, however the quality of these experiences, the way that we experience them, is completely missing from that description. This is a very simple example of a non-reducible quality, something that I believe most would agree do in fact exist but which science doesn't have a very good way of measuring or describing at the moment. Another way of stating this is that we appear to see qualities of objects that are greater than the sum of their parts. For example, if we had all of the atomic arrangements and connections, and the ability to put two brains mechanically in exactly the same brain state would they be "thinking" the same exact thing? This is very hard to quantify, but thoughts are certainly something real, if not exactly tangible. So I think that while science is a very powerful tool for understanding reality, and should be used as the basis by which we discuss and examine reality, there are a number of things which either aren't measurable yet due to a lack of tools on the part of scientists (electron clouds were an example of this), or which may not be measurable in any real direct sense at all (emotions, qualities of sensory information, thought processes) although indirect measurements are possible. Where I think scientists go wrong is when they assume something must not be possible based on how they believe the world works. If someone is experiencing something we cannot discount the explanations for it out of hand, although upon further study we may find that there are very sensible explanations for it!

Welcome,

What is the most prevalent pseudoscientific belief that you've come across?

[adenovato](#)

Thank you! I would say that the most prevalent pseudoscience I come across is misusing quantum atomic theory. In many ways quantum physics has become a new version of magic, so that when someone can't explain how something physically exists they begin to postulate things like "vibrations" or "uncertainty" or "randomness". Second most common is that Global Warming is not occurring!

Is it true you can lose a limb if you use liquid nitrogen in an unsafe way? Also what's with the lack of

goggles in your logo? Won't EHS shut your lab down with that blatant disregard for PPE? Jeeze.

[needlefish](#)

YOU CAN ABSOLUTELY LOSE A LIMB IF YOU AREN'T CAREFUL WITH LIQUID NITROGEN. Also since my logo doesn't use liquid Nitrogen we are entirely safe. I've heard tales of rogue EHS agents who will try to stop Nitrogen Ice Cream from being eaten if you aren't wearing goggles while ingesting it. So it's very important to be careful!

Hi Chris! I've been reading in recent years that while research and development funding in the pharma industry has increased substantially, the number of drugs reaching market annually has plateaued. I have read similar concerns for other fields of science, where the worry is that society is throwing a lot of money at a problem and not seeing dividends. Is there a way we as scientists can improve how we conduct research and utilize funding to better help society?

(Also.... microbial fuel cell 4 lyfe!)

[NASARocketman](#)

Oh those undergrads with their microbial fuel cells.

The problem of reproducibility in the pharma industry is a HUGE problem. In fact its such an issue that Merck has started attempting to change the industries R&D practices to include financial repercussions if research results are overstated or incorrect. <https://www.technologyreview.com/s/601348/merck-wants-its-money-back-if-university-research-is-wrong/>

The major issue in my opinion is that there is so much competition for funding that researchers are in some instances making false or overstated claims. This leads to industry spending money on papers that they then have to actively attempt to reproduce, since no one in academia is really performing reproducibility tests or publishing papers where they discredit or test the claims of another academics work. So I think there are a few potential solutions here. First off we could make peer review more serious, with tests proving reproducibility as a part of those papers that make the most serious claims (Nature and Science have now implemented this when an issue with a paper is spotted and pointed out by reviewers or readership!). We may also want to be more open with the public about how science is actually performed. And we definitely should begin publishing and promoting works that actively test the claims of others! Thankfully a number of the biggest journals have noticed and have started talking about this problem, but its one that we as active scientists and people interested in science can help promote as well by asking for these changes to be made! <http://www.nature.com/news/reproducibility-1.17552>

Greetings, Christopher! You totally don't know me and have never podcasted with me ever! We are DEFINITELY not part of a podcast group and TOTALLY aren't friends on social media. Definitely probably not.

So: what is your favorite episode of futurama and why is it "The Devil's Hands are Idle Play Things"?

[hoodatninja](#)

The reason it's the best, just like many of the best Simpsons Episodes, is because of the music!

Hi there! I've got another question. During the brexit referendum there was the famous "people have had enough of experts" line. Many, say that this is the sign of antiscientific thinking. However, is it

really the case? Can we really dump all of the topics together and give them equal credibility?

Is not believing that globalization has a positive impact on society as antiscientific as not believing in climate change?

Also, what do you think it's the role of science communication? Many believe that science can't get a single thing right regarding nutrition. And if you read newspapers (or even the headlines in this subreddit) you'd be right in thinking so ("fats are bad", "fats are good", "eat 400 grams/animal protein per day", "go vegan", "sugars are killers"). But if you really get to the bottom of it you realize that science is much more settled and much less controversial. But still, many nutrition experts with academic degrees do push for the wildest quack diets possible. Maximizing perceived confusion.

So, which experts should we listen to? How can we improve science communication (even if it's going to result in having 1/100 of the headlines per day)?

[lucaxx85](#)

Thanks for all the questions, love them so far! I am not a social scientist by any means, so if someone wants to chime in here with what you think of my answer below I would love to hear it!

I believe that you are correct in stating that there seems to be a difference between the so called hard and soft sciences, in other words does a statement such as "Heat cannot flow from a lower to higher temperature system" carry the same weight as "Tax Cuts for energy companies stifle innovation". In the first case we would consider this to be a law of thermodynamics (in fact its often called the 0th law!), while in the second we would consider that to simply be someones opinion. I think that in many ways this is the fault of how we treat the social sciences, as if they are less than the hard sciences because of the nature of their studies. But there is also a problem in the social sciences of the fact that these fields often try to tell us what we ought to do as opposed to what will happen, and that is something that will depend on the opinion of the person who is understanding and analyzing the data. So for example, we may find that globalization leads to a net increase in the standard of living of the world, while lowering the autonomy of individual countries. Well, which of those is the most important factor that should be maximized? Do we want more autonomy (and therefore in some minds more quality of life in the freedom of that life), or do we want a higher standard of living at the expense of autonomy? Those questions don't exist in the hard sciences. No one questions if energy in a thermodynamic system should be maximized or minimized, because we know from experiments that it will be minimized locally regardless of what we think should happen. I think a very important change to this discussion might be putting all of our cards on the table. We need to listen to the experts who are trained in these fields, but the public should also be given the tools to understand where these studies are being funded, what is the underlying goal of these organizations, how good is the journal that this information is coming from, and what are the underlying ideas being supposed in this study. Science communication plays a very important role in this, and I think being truthful about what we have studied, what our assumptions were, and what the results of those studies show us is a very important piece.

That being said, science communication is horrendous at the moment in my opinion. Even in my own field of nanotechnology we see sensationalist headlines and ridiculous claims making their way to newspapers and websites every day. The problem here I believe is twofold. First off, we have non-scientists communicating these ideas as part of PR for their universities or labs. And second, we have a drive to achieve the maximum amount of funding possible. These two things feed into each other, with PR firms and universities attempting to push their research as constantly groundbreaking and important in order to get more funding. So as opposed to providing the nuanced and carefully laid out claims of a scientific paper, we are giving reports to the public that state the best case scenario for this research and how it may alter their lives forever. We also no longer report failures or cases where claims have been disproven, a further issue in the scientific communication field that has been getting more attention in recent years.

And ultimately, this all feeds back into the original question you raised above. If we have people reporting unfounded or at least unrealistic conclusions from their results then the public is being given bad information. They see and notice that every week there is supposed to be a new cancer cure, yet their loved ones are still dying from the disease and treatment hasn't seemed to get any better in recent years. So either science is wrong, or scientists are lying to them. In either case this means we shouldn't trust scientists! It's a pretty horrible situation we've made for ourselves frankly, and I hope that the drive to publish falsification data as well as more serious science communication efforts will help make things better!

Over the last 20 years, the main focus has shifted towards technology. What do you believe will bring science back to the forefront of people's interest?

[piefordays](#)

Well, I think there is a large disconnect between the science performed in labs and universities and the ability to get that science out to the public in the form of technology. I think the average time to get a biomedical device from lab scale testing to hospitals is 15-20 years, while for materials it can be between 2 to 10. So there is a large time gap there, and I think since people are being told more about science we are in some ways shooting ourselves in the foot by saying some lab test points to a potential cure or something, but then not taking the next step to say that this is only a very early test in a much longer process. So I think we need to find interesting ways to talk about science, and also be sure that we are being truthful and open about the way science happens!

Another more procedural question...

What is your policy on comments and community contribution across your platforms?

Do you feel that podcasting helps you better communicate content because it's free from the trollish pseudoscience infecting your community comments?

[adenovato](#)

So we try to have open discussion across all of our platforms generally, but it can be hard to keep out pseudoscience/conspiracy thought when many of the topics we cover go into those fields. In some ways as something of a weird skeptic, a term I at least first heard on the excellent Monster Talk podcast and blog through Skeptic magazine, you have to expect a level of pseudoscience and dismissal when talking to people who usually believe these things/openly discuss them. But I believe (and maybe I'm being optimistic here) that if people were given the tools to dissect and understand scientific/pseudoscientific claims that they would more often than not come to the most reasonable conclusion as opposed to the one not supported by good science.

I feel like podcasting is a good medium for communicating ideas because it is truly free, in the sense that I am not limited in content, scope, production, or anything. I can tailor my message to be exactly what I want, and distribution is so easy that its possible for a small independent podcaster to get their voice out there. However this comes with drawbacks. I am not an expert by any means on a vast majority of the topics we cover, and so we try to be clear with those topics that what I'm presenting may not be 100% accurate but that we are doing our best by sourcing journal articles and good sources. And not all podcasts are as good about checking sources/facts before presenting them, which also allows a huge amount of pseudoscience and bad information getting out there.

Did that answer your question? If not feel free to reply!

My first undergrad degree was in philosophy, but then eventually worked through a PhD in Mechanical Engineering. I constantly see the philosophical struggle in my work, 'what is true', 'how do we know what we think we know', etc. I am able to apply this to my work but I see my fellow PhDs, in a variety of disciplines, bereft of the tools needed to approach their work. Do you agree that workers in STEM need more philosophical grounding to not only do their work but to communicate this to the non-scientific community?

[antiwittgenstein](#)

First off I have never been able to get all the way through the Tractatus, so the fact that you were able to form a strong enough opinion on Wittgenstein to make a reddit name is admirable!

I think Philosophy is a hugely important part of the STEM field, and one that we often don't discuss. I would love to develop a course (in the event that I am lucky enough to become a professor after a period in industry!) that discusses science as a continuation of the philosophy and naturalism of the past. But I also think its not necessarily taught that way because of the huge gap in mathematical knowledge required to begin teaching courses from their first principles. For example Thermodynamics began philosophically with assumptions about nature and the way that energy should logically move about. But it also began with partial differential equations and some general notions about how natural functions should operate based on ideas about equilibrium systems.

We also tend to focus on the application of scientific knowledge in STEM as opposed to how to obtain new knowledge, which would be that part of STEM that is still strongly linked to philosophy. So yes, I would love to see Philosophy taught to STEM students, and in fact taught to all students as I think it makes them more well rounded and able to formulate and understand difficult questions.

Hi there, wonderful topic!

So, in my opinion the most antiscientific period in history was "positivism". With the excuse of "we can measure everything and add the science prefix to every single topic" people started a ridiculous number of pseudoscientific theories (phrenology being the most prominent example). What's your opinion about this? Do we risk making the same error nowadays in some topics? (I'm thinking about neuroscience)

[lucaxx85](#)

Thanks for the question! I would argue that the most antiscientific period in the United States at least was around the same time period that the positivists were really becoming active, so right around the time of the second great awakening as we call it. That being said I have to put the qualifier on there like Homer Simpson, that this was the most antiscientific period in my opinion yet.

I think we do have an issue where we assume everything must be quantifiable and measurable. Although I am not a psychologist I think this has had pretty bad ramifications in that field in particular, where the use of chemical cures over therapeutic ones for a period of time led to the public beginning to discount and distrust psychology and moving towards self help style cures and a dangerous rejection of psychiatric science. That being said, there is also a very interesting notion in the pseudoscientific fields right now to make the same mistake the phrenologists did. So for example, ghost hunters now take tools to measure electromagnetic waves (assuming those tools even work!), infrared heat signatures, etc. But they do so under the assumption that these things must be measurable and physical, something that I believe actually takes away quite a bit from the possibility of "ghost encounters" as real phenomena (of course with the caveat that what these people are seeing may not be a "ghost" but rather a delusion, an artifact of some physical stimulus on their sensory apparatus, etc).

Do you think a lack of enthusiasm for science has anything to do with the current physician shortage in the US?

[Sheephurrrdurrr](#)

Honestly I don't know. I will say that one interesting thing is that because many researchers look at STEM as one large field, as opposed to a number of diverse areas, you get a lot of data that suggests opposite things. <https://www.bls.gov/opub/mlr/2015/article/stem-crisis-or-stem-surplus-yes-and-yes.htm>

I think one thing that promotes a shortage of physicians may not necessarily be the number of qualified people but the number of qualified people with the ability to work in the US. We see this a lot with masters students in Engineering. There is a glut of MS or MEng workers at the moment, but the vast majority are from other countries. And with a limited number of Visas allowing US companies to hire them these individuals study here but return to their home country, although they may like to find jobs in the US. So it is a bit of an interesting conundrum. If we want to have more US trained students then we should allow more Visas for these high skilled jobs, but if we want more US native workers then perhaps we should do something about the way that science/higher degrees are presented to students! One thing I believe may help this is performing more outreach to undergraduate students who may be interested in research but don't necessarily seek out those opportunities. If we get kids interested in research then I would argue it is more likely they will seek out Masters or PhD degrees in the future!

Hi, thanks for doing an AMA. I have a bachelor's of science in chemistry, but chemical lab work was never my forte (I could be good at it, but it just does not tickle my fancy). Instead, I love cognitive science and almost any of the interdisciplinary fields that make it up (I love philosophy but lack experience, I think AI is fascinating, and I am currently teaching myself computer science and programming through online resources).

You mentioned that you have experience arguing with people in real life who don't know the facts. This is something that has been the bane of my existence, and I think I have evolved to a point of non-confrontation, where I just go in sleep mode or whatever when I hear people spouting their pseudoscientific theories... I'm not proud of myself, but sometimes there are just too many arguments out there for me to run around with my degree trying to put the little fires out with my knowledge of facts.

One of the most startling things that cognitive science has revealed to me is the notion that one day our understanding of mind and belief will be radically altered, and this day might not be too far off (as in, we will live to see it). For example, does mind even really exist? Many are starting to question the existence of a "mind," and would rather refer to it as a place-holder for "many brains" inside our brain that operate together, just as one example. And I mentioned belief, because perhaps there really is no such thing as belief, as we understand it, anyway.

Now I'm at an impasse... How do I move forward with all these wishy-washy pseudoscience spiritual experiencers talking about things that might not even exist when supporting their arguments with lines like "oh well because that's what I believe." I don't want to offend people... Or should I?

[Carcassomyformerself](#)

Thanks for the question! I think first off if you love cognitive science you should check out the Breaking Math Podcast. Those guys are two amazingly smart mathematicians who did a really good series on the brain as a computer.

As for your question, I think that one important thing I always have to tell myself is that science does

not tell us how things ought to be (a moral question) but rather tells us how things are currently/how they work. It may be the case that these people believe something fully without evidence that can be measured, and so from a scientific viewpoint that wouldn't make sense. But it wouldn't be morally wrong, unless we apply some personal moral belief that the truth is the ultimate good, or something like that. That being said, I do think its important that scientists try to get to the bottom of why people believe these things, what they may have experienced, and how to talk to them about science in a way that is meaningful and convincing. And if you feel strongly about pseudoscience, or want to show someone evidence to dispute their claim then I think you should! Science is only as good as the way we communicate it, or put another way that is often told to starting PhD's: no one cares if you find a cure for cancer but never tell anyone about it. We need to communicate scientific ideas to the public, and I think everyone with interest in these fields the ability to play a part in that!

What is your favorite pseudoscience topic to discuss with others?

What is your favorite MOF?

[gorflox7](#)

My favorite pseudoscience topic to discuss with others is probably UFOs. They were always my favorite as a kid, and the mythology built up around them in recent years is huge and fascinating.

My favorite MOF is probably HKUST-1 because it is a very pretty color, and is very satisfying to make in the lab. It is really easy to synthesize and you get really high surface areas from it!

What's the most unconventional thing you've seen someone do with their science background?

[scienceaccount103040](#)

I think probably become a Rock Star. Or I guess, stop being a rockstar for a bit to finish a PhD thesis!  
<http://www.rollingstone.com/music/news/offsprings-dexter-holland-finishes-phd-thesis-on-hiv-w481935>

I've had conversations about the notion that religion, in all forms, is bad for humanity. Putting aside the wars, killings, and subjugations that religion has promoted the fundamental reason religion is bad is because it promotes the mentality that evidence is not needed for belief. Once you hold this mentality in any context I think it is impossible to hold a broad critical thinking capacity. This lack of a broad critical thinking capacity, (critical thinking across all domains, not just what you're good at) I believe, is the single greatest threat to the advancement and well-being of humanity.

What are your thoughts about this and religion in general?

[logicallyzany](#)

So I think as I've said in previous answers that science is missing all kinds of pieces for its own causal chain, and its in these places that religion now has fit itself. You see this historically actually, with magical thinking generally being relegated to smaller and smaller pieces of the natural world. That being said, the pieces that are missing today are pretty important. For example we know that if your brain is damaged your ability to think will be affected. We know that if you stimulate certain parts of the brain with electrical shocks you can make people believe that there is a ghost in the room with them, or that they are having an out of body experience. But we have no real solution for how the brain generates thoughts, how does our mental ability to consciously recall past events, current events, future events, and even things that have never existed come from. So to say that for instance a mind separated from the body cannot exist is, I think for even many scientists a step too far.

That being said, personally I have no religious belief. However, I don't begrudge someone else for having religious belief that doesn't affect me or other people. The problem is when religion is used as a causal link in itself. For example, "Global Warming isn't occurring because God would never allow the planet to die". That will affect us all, and is to me a problem. I think that's what you're trying to get at with your question. The saying goes that "Science doesn't care if you believe in it or not", and that is very true. But we can't stop someone from choosing to believe in their religious convictions. Instead what I believe we should do is teach how science is different than religion, how science is about building that causal chain, and try to show that religion can still exist alongside science in those places where morality comes into play. Again, science tells us how things are, not how they ought to be!

Hi! My question concerns an established subfield of medicine that appears to be pseudoscience. It is relevant because it affects a sizable portion of the population, and because it causes actual harm (for example patients being forcibly removed from their homes). Do you have a stance, opinion or comments on that?

The subfield in question is psychosomatic medicine, in particular diagnostic code F45 ("Somatoform disorders") from the ICD-10. I can't find an authoritative source for the diagnostic criteria right now, but ICD-10 states that

The main feature [of somatoform disorders] is repeated presentation of physical symptoms together with persistent requests for medical investigations, in spite of repeated negative findings and reassurances by doctors that the symptoms have no physical basis. If any physical disorders are present, they do not explain the nature and extent of the symptoms or the distress and preoccupation of the patient.

It appears to me that these criteria are logically unsound: Just because the patient's ailment cannot be explained with current medical tests does not imply that they do not have a physical basis — it may simply be that this basis has not been discovered yet. Even though not necessary from a logical point of view, this point can be substantiated with examples:

1. In the 60s, gastric ulcers were considered a prime example of psychosomatic disorders. However, in the 80s, it was discovered that they are mostly caused by the bacterium *helicobacter pylori*. (This discovery was awarded with a Nobel Prize.)
2. More recently (Oct 2016), a mast cell disease called "hereditary alpha-tryptasemia" has been discovered, which affects ~4% of the population. Its symptoms have substantial overlap with diagnostic code F45.3, which strongly suggests that F43.5 does not exist, but instead has a physical basis.

I cannot help but conclude that psychosomatic medicine is pseudoscience. Comments?

[i fail but i try](#)

First and foremost, I am not a doctor or psychologist, and so am not qualified to give any diagnosis or really information on this outside of general understanding of the scientific process. The important point in that diagnostic criteria is "In Spite of repeating negative findings and reassurances by doctors that the symptoms have no physical basis". Now it is up to the physician to determine if the disorder has a physical basis or not, however it is the repeated disregard of scientific findings that is at issue. I would also wager that layered on top of this is a disregard for the potential psychiatric causes that may be at play. For example, Morgellon's sufferers fit the classic descriptions of Obsessive Compulsive Disorder, in particular the skin picking, obsession with defects and discoloration on the skin, and ritualized nature of the "cures", and have even been shown to see improvement when treated with cognitive behavioral therapy. So there are cases where psychosomatic medicine finds successful treatment when treated with therapy/medication for psychiatric disorders. Again of course, there are

cases where doctors are incorrect and a true medical mystery is on our hands. But I think (and a MD can correct me if I am wrong here please!) that it is the obligation of the doctors to present all treatment options first before moving onto the idea that something truly unknown may be occurring.

What do you think the biggest breakthrough or discovery will be in your lifetime!? What do you think it will be within ten years after your lifetime?!

[bitcoins](#)

Thanks for the question! I would argue the biggest breakthrough is going to be in our use of nanotechnology for medicine. Already we see huge advancements at the lab scale, and so its only a matter of time (like I said in another question usually from 5 to 20 years haha) for this tech to get out there for us to use. That being said, I wouldn't be surprised if we find at the same time all sorts of new side affects/problems with nanotech for medicine, but that will come along with the good of helping to cure various ailments.

The biggest tech 10 years after my lifetime? Oooo, that's a tricky one. I hope its not robot bodies for human brains. That would just be bad timing on my part.

Will you be buying Women in NASA lego sets and are you excited about them?

[scienceaccount103040](#)

I am a huge Lego nerd so yes of course I will be!! I'm extremely excited. What I would really love is a NASA set of major scientists or something, where Marie Curies is full of glow in the dark blocks. Lego get at me!