AAAS 2017 Annual Meeting AMA Series: Hi, we're David Scholnik, Patricia Brennan, and Brian Baird and we value silly, odd, or obscure-sounding scientific research. Ask us anything!

AAASmtg2017 [1] and r/Science AMAs[1]

[1]Affiliation not available

February 19, 2017

Abstract

Hi reddit! Misunderstood or "silly sounding" research is often much more than it seems. We are interested in creative ways to explain the value of esoteric work in the face of public or political scrutiny. We are always looking to help scientists who work in controversial, odd, or obscure areas of research. Ask us anything about the kind of research we try to highlight, the scientists we try to support, and how "silly-sounding" science can lead to societal benefits. We (David Scholnik of Pacific University, Patricia Brennan of Mount Holyoke College, and Brian Baird, former United States Representative from Washington) are looking forward to answering your questions about the ways that individual scientists, their institutions, and the scientific community at large can work together to speak up for science, such as the Golden Goose Award, which recognizes silly, odd, or obscure-sounding research that has returned serious benefits to society. Patricia Brennan tweets as @sexinnature. Check out my research in the XX files at Science: My science is basic science We'll be back at 1 pm to answer your questions! Ask us anything!

the WINNOWER

REDDIT

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AAASMTG2017 R/SCIENCE

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What is your favorite silly sounding study that is actually really important?

firedrops

Patty: So many.... But... there was a study on growth of rat pups where they discovered that babies needed the mechanical stimulation of the mom to grow properly, so they had undergraduate students "tickle" rats pups to make them grow... They were made fun of, but then they connected with a doctor who study premature human babies, and she used their research to develop the infant massage technique that helps premature babies grow faster! This technique saves thousands of lives every year and lots of money on medical expenses. Check out their story in the Golden Goose award page.

Do you work with the IgNobel Prize people? This seems down their alley.

nate

Patty: Yes! I was just invited to give one of 24/7 lectures at the Ig Nobel awards last year. it was amazing. "Science that makes you laugh and then makes you think".

Do you have some tips for how we can better communicate our research, especially when its importance may not be obvious to the public?

Upvotes4theAncestors

Patty: There are many resources for scientists out there. The Alan Alda center for science communication trains scientists to communicate more effectively, but there are many others (for example the book Don't be such a scientist is also great). The AAAS meeting regularly has workshops on communicating science and some professional societies have started adding this more and more. Like any new skill it takes studying and practice for anyone to get better at it, but it is extremely important!

Do you have some tips for how we can better communicate our research, especially when its importance may not be obvious to the public?

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This is a very good question and I actually think we need to have a frequently asked question package that all scientists can learn and that has in some way been tested with the public. Re fruitflies, and for that matter most other questions, I'd use an algorithm approach without calling it that. The structure of the algorithm is, briefly, 1. Start with what they know. In this case, you probably know that certain traits of organisms can impact their ability to survive and those traits can then be passed on to the next generation? If they know that, then go on to 2. If they don't know that explain how it works. 2. Explain how the general knowledge applies to this example. e.g. Well, if you've ever had fruit flies in your fruit basket at home you know they multiply incredibly rapidly. That means we can actually create a number of successive generations of the flies pretty rapidly. That let's us test all kinds of things to see how they impact survival, development or behavior etc. For example, would a certain modification change how fruit flies locate mates, or find food, etc. 3. Why is this important? Then explain how it's important to a practical problem. So if we use fruit flies as a model, we can test out all sorts of things that we might then use to do things like control mosquitos that carry malaria, fight bugs that eat crops. In general I think a structure like this is pretty effective because, most importantly, it starts with what people know, respects their knowledge and interest, and makes it both accessible and relevant.

Do you have some tips for how we can better communicate our research, especially when its importance may not be obvious to the public?

Upvotes4theAncestors

David here. Great, and difficult question. I think it is imperative that scientists are able to clearly explain how their work directly impacts the public and how it is important to the betterment of society. The days of scientist thinking that their data can speak for itself are over. We need to make sure to find creative ways to clearly and accurately explain complex science to the public.

Thank you for doing this AMA!

One thing that revolutionized my own understanding of effective science communication was the recognition that it is often easier and more memorable for members of the public to relate to the story of a scientist than to the story of his or her work divorced from any human "character." Do you find this to be the case in your experience? What other narrative strategies do you recommend to invite people to take a closer and more sympathetic look at "silly" science?

neurobeegirl

Patty: Story telling is extremely effective! There are many excellent examples of unexpected benefits

from silly sounding science in the Golden Goose award page, and you can tell these stories in your classes or during outreach talks. I have compiled a few in two of my publications. Check them out in Research Gate.

--I want to know how these studies get funded. I've seen studies described in New Scientist:

Sex with a partner 400% better than masturbation Didgeridoo playing reduces sleep apnea Sweat from men who don't shower increased libido when applied to the upper lip of women Fantasizing about sex while lifting weights increased bicep size more than when fantasizing about sports.

Seriously, who pays for this? It's like the NIH funding a study to see if kids like ice cream. Aside from the sex with partner study, which measured dopamine levels, all the other examples I mentioned were fraught with methodological problems and were either biased, placebo effect, or probably type-I error. Who funds these types of studies?

--Some oddball science, like the ignobel prize, or British Medical Journal's Christmas issue, actually use rigorous methodology. What sort of scrutiny do you apply when evaluating this sort of science? I see methodologically unsound science published in leading journals, and they at least have a serious topic, and a serious question. I would expect you would need an even higher standard when evaluating the methods of "oddball" science

Specific questions (you can PM me if you think this is not appropriate for the AMA, or you can ignore, since this is just mild curiousity, and I am not in this field):

1. David, you are doing work on infections that might alter metabolism in various animals, and you assess oxygen consumption, lactate, etc. I only glanced through your work, so I apologize if I you've already thought of this and written about it. Do you think the impaired cellular respiration is a problem of oxygen utilization (mitochondrial "poisoning") or that of delivery? If deliver, do you think it is a problem of global decrease in oxygen delivery, or due to imbalances in delivery, like microvascular shunting?

2. David, I see you work with infectious models on several different animals, including invertebrates. I think this seems really challenging, since you are studying disease in several disparate physiologies. Even the difference between birds and crocodilians is massive in regards to a immunologic and autonomic perspective. How do you make sense of these processes in different animal models?

3. Patricia, I'm sure you get asked this a lot, but what is the evolutionary pressure for pigs having a corkscrew penis?

4. Patricia, this may be more of an anthropology question, but I've heard somewhere that humans probably started selecting for bigger penises due to walking upright and possible in part to missionary sex, to compensate for a more withdrawn vagina. Any truth to this?

Thanks for doing this AMA. I think keeping science fun is a great way to promote science.

PussyStapler

Patty: In response to #3. Lots of animals have corkscrew shapes in the tip of their penis. In pigs specifically female sows have vaginal ridges that need to be stimulated for pregnancy to be successful, so perhaps these shapes help to stimulate females during mating. Unfortunately we don't really know, since these studies typically don't get funded. In response to #4 The human penis is actually not disproportionally long compared to other primates given our body size, but it is disproportionally wide. One possible explanation is that selection for babies with large brains possible selected for wider vaginas, and in order for copulation to be possible, male penises became wider to "catch up". The

missionary position is likely because of changes in hip position as we became bipedal.

--I want to know how these studies get funded. I've seen studies described in New Scientist:

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PussyStapler

David here, great question about impaired metabolism. Have found that bacterial infections can result in impaired circulation through the small vessels in the gills resulting in elevated anaerobic metabolism. It appears that the immune cells can form aggregates that block hemolymph (blood) flow. Found a direct link between the levels of bacteria and an increase in lactate and decreases in oxygen consumption.

What are the most important advancements in the history of science that were once thought of as esoteric, odd, obscure, or silly-sounding?

drsjsmith

Patty: PCR technology, which is used to amplify DNA, and it really jumpstarted the genetic revolution (estimated to be worth about one trillion dollars in economic benefits), used an enzyme from a bacteria (Thermus aquaticus) that was discovered living in thermal pools in Yellowstone park. Dr. Brock was just walking around when he started thinking about what was the slime growing on those thermal pools... He started the whole field of extremophiles!! So just based on his curiosity to try to explain something that seem odd, he discovered something that transformed society. There are many more examples in the Golden Goose award website!

What are the most important advancements in the history of science that were once thought of as esoteric, odd, obscure, or silly-sounding?

drsjsmith

Brian Baird - If you think about it, the serendipitous observation that certain molds can prevent growth of bacteria seems silly, but of course it lead to penicillin, which is rather important to say the least. In the social sciences, game theory, was once derided in Congress, but it's produced a host of applications from spectrum auction to organ donor exchanges etc. Thanks for asking

Given our current climate of increasing scrutiny on the value of scientific research, do you find it harder and harder to sell the public on the value of seemingly obscure and "silly" research? I've noticed that there's increased questioning of whether public funds should be spent on research that the public can't easily understand the value of. Have you noticed that this has made your job harder at all?

fsmpastafarian

Patty: Federal funding for research grants has been getting harder and harder to get, and that makes our jobs more difficult for sure. We study oddball science because it is in exploring anomalies and rarities that we often discover completely new principles of nature. We need to make this connection between studying innovation in nature, and being able to innovate in our society very clear to the public. Some awesome examples are found in biomimicry.

The argument that silly research should be funded because we might accidentally invent the next superglue or whatever has never seemed like the best case for supporting basic research. What is another line of argument that makes a good case?

Jobediah

Hello Jobedah, Great question. I addressed it a bit above. The problem you highlight is this, while it's true that many basic research findings have unexpected and incredibly valuable results, that does not mean that therefore all basic research is justifiable regardless of what it's about. I think we need to defend basic research but even while doing so ask very honest questions and have answers about why any specific research is worth doing and what it might or might not tell us. Also, there needs to be a tough cost benefit question kept in mind because if we don't ask those questions the people who collect and distribute tax dollars, i.e. members of Congress and the administration, will as will the taxpayers themselves.

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another line of argument that makes a good case?

Jobediah

Patty: I think about it the other way around: Not all basic science projects end up becoming some application, but every single application requires basic science. For example, think about the phone in your pocket or the clothes you wear... They are the direct result of decades of basic science that went into making new discoveries.

Silly-seeming science and research is often highlighted as examples of "wasteful spending," and I cannot help but think this interferes with funding on a much larger scale with much less silly subjects. Have you ever witnessed this in the course of work? How can the "wasteful spending" finger-pointing be avoided?

mamamedic

Brian here. First, I think we need to check our own value before others do. By that I mean, and I know this is not easy or popular among scientists, but we need to honestly ask ourselves before requesting funding if it's worth taking other people's hard earned money through taxes to fund our research. Often it is, but wee need to be able to explain why and have at least some reason and response in mind before we start. After that, we need to have a simple, compelling and honest answer that we can give in a few sentences that explain why what we are doing matters, how we're doing it, where the money goes, and what the findings might teach us. If we do that, the efficiency of the external attacks will be substantially diminished and we'll be ready for them if they come.

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Patty: My sense is that attacking silly sounding science erodes public trust in science in general. It makes it sound as if science funding decisions are frivolous and not subject to very close scrutiny, when nothing could be further from the truth. We need to constantly educate the public to be critical thinkers and understand the importance of basic science to make political attacks unviable, but this is going to take time! We need to start this process during middle and high school.

Do you come across many joke citations such as this chicken paper?

halborn

Patty: Ha, ha!!! Priceless!!! Not really...

David, can I get myself a shrimp treadmill of my own?

jhshiode

David here, of course. Check out amazon.com where it should be posted at a hefty price to try and raise some public awareness about silly attacks on science and raise some money to fund basic

marine biology research.

Have you worked on explaining research done with fruit flies to the public? How do you explain this to those who are not scientifically literate?

helm

Brian here. This is a very good question and I actually think we need to have a frequently asked question package that all scientists can learn and that has in some way been tested with the public. Re fruitflies, and for that matter most other questions, I'd use an algorithm approach without calling it that. The structure of the algorithm is, briefly, 1. Start with what they know. In this case, you probably know that certain traits of organisms can impact their ability to survive and those traits can then be passed on to the next generation? If they know that, then go on to 2. If they don't know that explain how it works. 2. Explain how the general knowledge applies to this example. e.g. Well, if you've ever had fruit flies in your fruit basket at home you know they multiply incredibly rapidly. That means we can actually create a number of successive generations of the flies pretty rapidly. That let's us test all kinds of things to see how they impact survival, development or behavior etc. For example, would a certain modification change how fruit flies locate mates, or find food, etc. 3. Why is this important? Then explain how it's important to a practical problem. So if we use fruit flies as a model, we can test out all sorts of things that we might then use to do things like control mosquitos that carry malaria, fight bugs that eat crops. In general I think a structure like this is pretty effective because, most importantly, it starts with what people know, respects their knowledge and interest, and makes it both accessible and relevant.

What is your favorite "silly" study title?

McFlare92

Brian replying. When I served in Congress the Republicans sought to defund a study of how people in other cultures express emotions nonverbally. They argued based solely on the title (the exact wording of which I can't recall) that it was obviously a waste of taxpayer money. I took the time to read the grant proposal and the study title and it turned out this was something that the Pentagon had requested because they had learned that our troops in Iraq and Afghanistan did not understand how the local populace was expressing emotions through facial expressions, gestures etc. That cultural gap could lead to fatal or otherwise dangerous or counterproductive interactions. SO understanding that purpose allowed me to defend the study in Congress and urge the defeat of the Republican amendment because the study they had attacked was in fact being conducted for the sake of our troops. The key thing here and the moral of the story is that the Republicans who attacked the study had not even gone to the trouble of reading the abstract. In fact, after the vote they asked me how I came to know so much about the study and I told them I'd read the abstract. Their response was, "What is that?"

People often rail against silly science as a waste of money, but how much money is actually spent of the sort of science you investigate? especially relative to all spending.

Doomhammer458

Thanks. At the big picture level, total federal spending is a bit over 4 trillion per year. Total NSF funding is a bit over 7 billion. That total NSF budget includes a number of big ticket expenditures, so what is left for smaller studies is much less. It should be noted that NSF is not the total recipient of science funding. Roughly speaking, total science funding, which includes NASA and other big investments totals about 30 Billion. The challenge is, that it's easy to deride small studies and imply that those

"wasteful" examples are part of a larger government out of control and if we just reign this in we can fund everything else, including social security, medicare, defense etc. That's of course nonsense mathematically, but people believe it.

People often rail against silly science as a waste of money, but how much money is actually spent of the sort of science you investigate? especially relative to all spending.

Doomhammer458

Patty: The entire biological directorate of NSF gets about $600 million dollars. There are several divisions within this directorate and they get different amounts of funding. Funding rates are 4-5% in some of these programs because we have many more PhDs graduating each year.

First of all, I'd like to thank you for doing this AMA!

I have a question that may seem a bit unusual. As I can understand it, you have quite a bit of experience trying to present and sell ideas to the public that they find absurd, bizarre, confusing, etc. My own field of Aerospace Engineering is beginning to face a similar problem: we've essentially squeezed out all the efficiency we can out of the standard tube-and-wing airplane design that most people are familiar with and you see flying every day; to make significant improvements, the best path forward are radical new designs like flying wings (think the B-2 Spirit Stealth Bomber or even a multitude of other ideas.

From your experience, what do you suggest would be the best approach to communicating that these new, crazy looking planes would be just as safe as the current design and perform better? How could we address the reluctance of the public to accept certain minor drawbacks (such as fewer windows in the case of the flying wing) in exchange for lower emissions and possibly even less expensive flights by virtue of reduced costs?

One of the big problems in aerospace is public confidence—getting the public to trust and want to fly in one of our planes; this is particularly difficult for any plane radically different from those they have experienced before.

I apologize if this question isn't exactly what I had in mind, but reading about what you do and some of the answers I thought it might be right up your alley. Thanks again for your time and for "coming out here" to talk to us!

TheSuperSax

Patty: Wow! Interesting question. I can't imagine the barrier of convincing people to trust new technologies like that. Humans really are creatures of habit in many ways. Perhaps acknowledging the fear and putting it out in the open would be a first good step. Sorry I don't have any dramatic insights.

Hello and welcome!

Do you see your work more as promoting more obscure low impact journals or mainly emphasizing individual researchers/projects?

PHealthy

It could be both. One of the risks of the "obscure low impact" journals is that there may be so few people engaged in the activity that it's hard to show the broader impacts to the general public That

said, sometimes what is obscure today is hugely important tomorrow. At the same time, there are some issues that are so small and esoteric because they really don't have external impact and in some instances the practitioners don't seem to care. That can be a problem in terms of relevance. One of the broader challenges facing all of academia today is that of relevance. Soon to be gone are the days of ivory tower academicians isolated from the rest of the world and devoid of real connections or applications. I know that's anathema to academia, but students, their parents, funders and the public are asking for more and that's not necessarily a bad thing.

What is the most "silly sounding" research you know?

-LifeOnHardMode-

David here, it is amazing how easy it is to make basic research sound silly. Trying to understand complex questions requires a very creative approach that can seem on its surface very strange. I have come to realize that most of my work could easily be made to sound silly. Shrimp on a treadmill to study disease. Lizard heart rate monitors to determine how malaria impacts infected lizard pathophysiology.

What is the most "silly sounding" research you know?

-LifeOnHardMode-

Here's a kind of a neat coincidence. A former board member of AAAS, a mathematician who was at MIT, just stopped by to talk about how she studied the structure of soap bubble clusters. That might seem like a silly thing to some, but material scientists then began to link how foam may relate to the crystalline structure of metals, albeit in a more complex form. She then described other puzzles that mathematicians have studied and how those have had surprising applications. The key point is there are some things that seem very esoteric sometimes have intriguing and important applications.

Brian, what was it like being a pro-science politician? What do you think are the most effective ways for scientists and the lay public to convince our politicians in the value of funding science (even "silly" science)?

p1percub

Thanks for the question. I came to realize rather surprisingly and rather late that the model of knowing and serving which I as a scientist take for granted is much different from the adversarial truth is what people believe model that many attorneys, which is to say many members of Congress, adhere to. As a scientist, information that contradicts something I may have believed is not seen as a threat, but for many others in Congress contradictory information is seen as a threat. That's a strange position to me, but perfectly normal for them. Add to that the fact that most members of Congress have very little knowledge of the scientific method or findings, especially in esoteric or highly technical fields. So then you've got potential conflicts in perspective, knowledge, values and purpose. Plus, throw in a public that has similar perspectives and you have a complex challenge. All that said, I think it's precisely why we need more scientists in public office and more scientists engaged in public advocacy for science. AAAS does that well, but we need individuals to do it with their own representatives as well.

With things like the recent trends in studies on gut microbiota making it to more lay media (even if its the educated lay), are we getting closer to breaking the taboo (per se) of research relating to

excrement?

In particular, such research is useful, at the very least, because of the health related implications as an indicator of health. I recognize a fair potential for related research in multiple disciplines, how do we get past stigma and taboo in underappreciated topics to better understand the world around and within us?

jddbeyondthesky

Patty: I have experienced some of this by studying genital structures... penis and vagina are not words that most people use in daily conversation! However genitalia play a crucial role in the biology of organisms with internal fertilization, and our reluctance to talk about them does not make them any less important. I just use the proper scientific words for the structures I study, and hope that as we learn more about them, people will feel more comfortable discussing them in scientific ways. But adjusting to this will take time, and I try hard to be respectful of people who may be uncomfortable with these topics no matter what.

How do you go about finding and cataloging all of the silly science out there?

mmm_toasty

Patty: All science can be made to sound silly when taken out of context, so I think there is not a lot of actual silly science to catalog. You could probably track down things that have been made to sound silly by politicians who use this to get attention at the expense of science.

Hello and thank you for speaking with us today!

How do you feel about the shrimp treadmill? It is one of my favorite "silly sounding" research topics. Were there any facts that were overlooked with this study given its oddness?

Thank you again for your time!

FillsYourNiche

David here, I was the one that put a shrimp on a treadmill as part of a large study to understand how disease is impacting marine organisms. The work was completely misrepresented as wasting millions of taxpayer dollars when in fact: I built the treadmill for $47 that I paid for myself The shrimp were not put on a treadmill to exercise but to measure how bacteria was impacting their biology. The treadmill was only a very small part of a much larger project to better understand commercially important species and possible implications to human health.

Hello and thank you for speaking with us today!

How do you feel about the shrimp treadmill? It is one of my favorite "silly sounding" research topics. Were there any facts that were overlooked with this study given its oddness?

Thank you again for your time!

FillsYourNiche

And here is a link that explains some of what was overlooked.
http://www.chronicle.com/blogs/conversation/2014/11/13/how-a-47-shrimp-treadmill-became-a-3-million-political-plaything/

https://blogs.scientificamerican.com/guest-blog/the-rise-and-fall-of-a-shrimp-biologist/

A lot of research may seem odd or obscure sounding to a lot of people but is actually critical. Can you let me know what your definition of 'odd' is?

DrWYSIWYG

Patty: I first saw the term "Oddball science" in a news paper article in the Washington Post. I think it generally refers to projects that are weird and that people have not thought about in a scientific context. As scientists we are usually looking for oddities because this is where more innovative principles of nature can be found: in phenomena that are not easily explained by our current understanding of the world. When we can study these principles, we can then support real innovation in society.

A lot of research may seem odd or obscure sounding to a lot of people but is actually critical. Can you let me know what your definition of 'odd' is?

DrWYSIWYG

For me, one of the most important things science can do is disprove things people already assume is true or known or proven but it turns out are not true. The challenge is, many in Congress and in the public seem to seek out only that which confirms what they already think and reject anything that might challenge them. That contradicts a fundamental premise of science, i.e. assuming that what we believe might be wrong and trying just as hard to disprove what we think.

Do you think that some of these "silly sounding" studies are actually silly, and not worth time/effort/resources?

viking_

Yes. There are definitely studies that are not worth the money and I have said often, as I did again today, that we need to monitor ourselves first and make sure we're only doing studies that are worthwhile. But, the vast majority of studies that apply for grants are not funded at all, and the criteria for receiving money are actually very stringent. What is more, the ROI for many of these studies that have been done in some instances has vastly outweighed the expenditures.

Do you think that some of these "silly sounding" studies are actually silly, and not worth time/effort/resources?

viking_

Patty: No. Pretty much any scientific study taken out of context can be made to sound silly! Any study that gets federal funding has been thoroughly reviewed by other scientists and administrators who have a common interest in moving science forward.

David- I had no idea lizards could get malaria! What can we learn about the epidemiology and transmission of infectious diseases from wild animals like lizards? Do pathogens affect lower vertebrates differently than humans? More/less deadly?

p1percub

Lizards have turned out to be a very valuable model because they have populations with very high infections, the parasite kills the immature animals and lizards have very low aerobic metabolism - so a parasite that attacks blood cells is important to understand in an animal that is already oxygen limited.

Brian, how can we convince the funding agencies that science that seems "silly" on its face is actually in fact important, or even essentially to progressing our understanding of the world around us?

DoShitGardener

Brian here. Thanks for the question Some of the other replies I've given have shown that first we have to make sure what we are doing is in fact worthwhile and if it isn't we should do something else with our brains our time and the public dollars. If we pass that first test, the next task is how to communicate effectively what it is we're doing and why. If you look at some of the other posts in this stream I've tried to give some thoughts on that.

What is your favourite examples of "silly research"?

My personal favourite is when Andre Geim and Michael Berry won the ignobel prize for using magnets to levitate a frog.

Kvothealar

Patty: I just saw one last year about fooling your brain into thinking you are scratching your right arm by scratching your left arm and using a mirror. Amazing!

Patricia, I heard that not all sperm is shaped the same? Why is this the case? By what mechanism do you think different sperm morphology would have evolved?

DoShitGardener

Patty: Yes, sperm have evolved many different morphologies depending on both natural and sexual selection. For example sperm in rodents have hooks on their heads because they form trains, hooking into each other, to move more efficiently inside the female. Some species have extraordinarily long tails so that they can swim faster and outcompete sperm from other males. Others have very long mid-pieces that are the "battery" of sperm, so that they can swim for longer periods of time. Their shape is influenced also by the female environment. Females often evolve chemical and physical barriers for sperm, so sperm evolve to overcome these barriers, and this results in very different morphology and physiology.

David, are you the one that did the sick shrimp on treadmills project? Can you set the record straight on that?

timeforathrowawayact

David here, check out the article below http://www.chronicle.com/blogs/conversation/2014/11/13/how-a-47-shrimp-treadmill-became-a-3-million-political-plaything/

What is your favorite Golden Goose-type study?

cc_cyanotephra

Patty: Tickling rat pups leading to infant massage technique for premature babies!!! And... Mating behavior of screw worm flies leading to the sterile male technique to eradicate agricultural pests.