

**Episode 2,400: Government and Science: A Dreadful Mix**

**Guest: Terence Kealey**

**KEALEY:** Tom. It's a pleasure.

**WOODS:** Why can't we get your book back in print?

**KEALEY:** Well, that's a very good question, but I'm writing a new one. I've very nearly finished the manuscript. This is the first time I'm writing a book without setting up a publisher in advance, because I don't want the pressure. I want this final book to be, you know, in a sense, "right".

But all the stuff that was really covered in that first book will be covered in the second book in a much shorter way, but it'll be there. So, I hope it won't be forgotten forever, the material in that book. Thank you for asking.

**WOODS:** Okay, good. Any time people have asked me about the question of the relationship between government and science, and whether this is a case of a genuine so-called "public good" which therefore requires (according to neoclassical economics) government funding.

I get this from a lot of libertarians who feel like maybe this is, if we're being honest with each other, with the doors closed and the bad guys not listening, we might say to each other: Maybe this is an exceptional case where we have to admit the utility of government intervention.

I've always referred them to your book. And I have a lot of authors on whose books I respect very much. But I was just saying to my wife as I was getting ready for this, that – I'm not making this up.

I genuinely believe that your book, after all, the many, many, many books I've read in my life, that *The Economic Laws of Scientific Research* – which is a book you cannot find, it's very hard to find, if you have one, it is worth more than gold – is legitimately one of the best books I've ever read, in the sense that it is overwhelmingly persuasive.

It taught me something on every page. There is no fluff in it. I hate books that are just the author just yammering on pointlessly with no specifics, no examples, no data, nothing. There are so many of those in the right-wing radio sphere. We can't read any of these radio host books.

But this book, absolutely – I was weak on this subject. And then I read your book and I scolded myself and reproached myself: How could I have been so weak when the evidence is so strong? So, I would like to talk with you about some of the themes in there.

Because I guess another reason the book is such a revelation to me is that it really, really reinforces the – common place in the libertarian world – that very often the truth of something is the opposite of what your initial instinct tells you.

And your initial instinct tells you: *Well, there's no profit in "science", so therefore, an institution not aiming at profit needs to be behind it*. All these sorts of things that you might think make sense, it turns out don't hold at all.

So, let's begin with this. I think a lot of us believe that the way science progresses is you have laboratories (perhaps publicly funded) in which people in white lab coats, unencumbered by considerations of profit, are able to devote themselves to the pure study of so-called "basic science".

And these discoveries that they come up with accumulate and eventually are put to practical use. So, of course, we couldn't have this benign process, we couldn't get the ball rolling, if there weren't funding for these laboratories and these scientists to begin with.

You seem not to believe any aspect of that story. So, why not?

**KEALEY:** Well, simply because it's not true. The story was invented by an English politician called Francis Bacon right at the beginning of the 17th century.

And he was basically looking for a job. And he tried to persuade the king (King James) to create, essentially, the National Science Foundation in 1605, in England, 400 years ago.

That would be run by one Francis Bacon so that he would have a nice job from the government. And the argument he put forward is that without the government funding of pure science – he actually articulated the argument beautifully. It's wrong, but he articulated it beautifully.

Without the government funding of pure science, there would be no economic growth, and there would be no industrial revolution. He was anticipating an industrial revolution. And this case was completely destroyed by Adam Smith in 1776.

So, these are very, very old arguments. Adam Smith pointed out – this now was the industrial revolution. He was walking through the factories. He was actually discovering where the new technology was coming from.

And he simply said: *It's simply not true that the new ideas are coming from the universities. In fact, it's the other way round.* If you look at James Watt and his steam engine, it's James Watt who comes up with the new concepts of thermodynamics that the universities then scramble to catch up with.

If you go on the shop floor of the factories and ask people, where are the ideas that you've put into practice? Where do they come from? They're coming from the researchers, the technicians actually on the factory floor themselves.

It was a complete myth that Francis Bacon came up with, purely out of self-interest. And Britain and America never believed it. And that's what's so interesting.

If you look at the history of Britain during the 19th century, when we led the world economically, and the history of the United States of America during the 20th century, when you led the world economically, there was no government funding of science.

All that starts with Sputnik. Before Sputnik, in both Britain and America, purely industrial-funded. And we were the two leading economic countries.

The countries, ironically, where the governments did fund science very generously France, the German states, and other continental countries, they never even converged on Britain, let alone did what the United States did, which is namely overtake.

If you look at the history, the history is clear. Laissez faire in science, economic domination. Government funding of science, you never catch up.

**WOODS:** As I recall, even the case of the Wright brothers with their airplane, they accomplished human flight, even in the face of scientific authorities telling them that human flight was just not going to happen, it would always end in grief, it was hopeless. And then they demonstrate that it happens.

So, then after the fact, the science then has to reconcile itself to reality. And I think that also may have been true in the case of some 18th and 19th century innovations as well.

**KEALEY:** The case of the Wright brothers is even worse, I'm afraid. It's a real scandal and a shocking story. So, the Wright brothers get the first airplane (heavier than air machine) up in the air in 1903. It costs them $1,000.

They were racing against the Smithsonian Institution, which had got a grant of $50,000 from the State Department, because there was a war going on in Cuba at the time.

And the Smithsonian Institution promised the Defense Department and the State Department, in exchange for this grant, they would invent this heavier than air airplane, and they'd be able to bomb the Cubans from the air.

That was the deal. But they lost the race. The fact they were nowhere near the race. The Smithsonian Institution's (aerodrome, they called it) was a hopeless thing. They were nowhere near flying an airplane. The Wright brothers got there first.

But then what's awful – and this is what's so scandalous – is the Smithsonian Institution then lied right up to 1917 when the Americans joined the First World War. So, what happened? Between 1903 and 1917, the Smithsonian got together with one or two other local entrepreneurs in the States to promote the lie that they had beaten the Wright brothers.

And they needed to promote that lie because they wanted more grants from the State Department and the Defense Department. And they literally lied. It's a most extraordinary story. And so, the Wright brothers had to take them to court for patent infringement.

Every single time they went to court, the Wright brothers won the case. But the problem was the Wright brothers were spending all their time in court. The Smithsonian was telling all these lies all the time. Glenn Curtiss was also a Smithsonian ally, also in court.

By 1917, when the Americans finally joined the First World War, you did not have an Air Force. The British did, the Germans did, the French did. But the Americans, uniquely, didn't have an air force because everyone was in court all the time.

And so, in 1917, Woodrow Wilson, your president, pushed through what's called a "patent pool", which is a legal stratagem to take away the Wright Brothers patent so that anyone could now build an airplane without having to worry about patents. And thereafter, the American industry took off.

But the extraordinary thing is the lies. And by the way, the Smithsonian has since admitted to these lies. The lies of the people who were trying to get the government funding of science institutionalized, were prepared to tell in defense of what was only a lobby.

**WOODS:** Is medical research an exception to, in effect, the rules you're describing in your book about the origins of science not necessarily deriving from abstract investigations in laboratories?

**KEALEY:** No, it's not. The medical research is an exception for two or three reasons. Very interesting exceptions, but none of them fundamental. Firstly, there is a huge democratic desire to support medical research.

So, before Sputnik – when the American government and the British government switched over to a philosophy of actually believing that government should fund science. Before Sputnik, the standard policy of the American and British governments, that governments shouldn't fund science, there was no economic justification.

But there was always an exception for something called "mission research". Mission research is very different from the idea of: Basic science gives you economic growth. Mission research is: We're going to do this particular mission.

To hell with basic science. The government is going to behave like Unilever, or it's going to behave like Microsoft. It's just going to fund research because it wants a particular mission solved. And health was always one of those missions.

So, the American people have always believed that government should support medical research, because, basically, they don't want to die of cancer. So, in that sense, it's an exception. There's another sense in which it's an exception in that patents – I think that's too broad a discussion today, Tom, though I'm always happy to discuss patents.

Patents are a scam. There's no justification for patents, because the justification for patents is that science is a public good, and without patents people would fund it. And all of that's wrong.

But there is an exception in the pharmaceutical industry because the costs of regulation are so great that you do need to be able to give patent protection, because otherwise the costs of copying are dwarfed by the costs of regulation.

So, government burdens you with regulation, then the government should offer you patent protection. So, that's another exception. But no, it's not true what you suggested, that basic science leads to developments in applied science, which leads to medical advance.

There's a man called James le Fanu, a British doctor, and he published a book about ten years ago. He looked at the ten major advances of medical science since the war, and nine of them had come out of clinical observation or applied observations, with the basic science catching up afterwards.

So, medical research does not support the idea of basic science stimulating economic growth. It doesn't work in medical research the way it doesn't work in any area of research.

**WOODS:** Can you, first of all, explain to me what clinical biochemistry is?

**KEALEY:** We have a belief in Britain – and don't know how these different national traditions emerge. We have a belief in Britain that the interpretation of blood levels, of in patients, of biochemistry, but also immunology and other things that you measure in blood, is really quite complicated, really quite sophisticated.

The average clinician is not very good at interpreting them. And so, what you need is someone who is medically qualified and scientifically capable to run the laboratory, but also to help clinicians in the ward interpret their results.

I have to say – and I say this reluctantly because I'm a great respect of my colleagues. It is true that doctors are very bad at interpreting biochemistry. They just are.

And so, in Britain, we've responded to that by making sure that every lab in a major hospital is headed by someone who's an MBC PhD (to use American language) who understands the biochemistry, and who also understands the medicine, to act as a sort of attache, the scientific attache from the world of science, the world of medicine.

**WOODS:** Well, I ask because I can't help but inquire about the reception you've received when it comes, not to whatever research you may have done in your field, but to this sidelight of yours investigating the relationship between government and science or the economics of science.

I can't imagine that the conclusions you've drawn are especially welcome in your field.

**KEALEY:** No, they're not. And I remember a good friend of mine when I was at Cambridge repeating a conversation he had with a very distinguished, very, very senior researcher – he wasn't a Nobel laureate, but he was of that sort of class, who said to my friend: *This terrible man Kealey was a terrible menace.*

And my friend had said to him: *Yeah, but everything Terence has ever said has been confirmed to be true*. And this great scientist said: *Yes, and that's what makes him so dangerous*.

And his philosophy was, which he articulated to my friend in the corridor of the hospital where there's a big science element, was that scientists should always be honest in everything except for when it comes to funding.

And when it comes to funding, there's something called "the noble lie". And the noble lie is that scientists should always defend the funding of science using whatever arguments they could draw on. Because it doesn't really matter whether it's true or not. We need to defend science regardless.

And I'm afraid that one of the awful things about the government funding of science is that every interest has a vested interest in its being funded by government.

So, government loves funding science because the sums of money are relatively small for government, and yet ministers and presidents can strut around the place, pretending to be Medici as a great patron of Galileo and the arts.

So, for example, in the year 2000, when the human genome was finally, for the first time, sequenced, who stood up on a podium and announced that he had done it personally? Bill Clinton. [laughing] Bill Clinton tried to take the credit by announcing the sequencing of the first human genome.

And we all know that Al Gore invented global warming. So, politicians want to fund science because it gives them a legitimate role in society. Scientists want governments to fund science because if governments don't fund science, that scientists are accountable.

They have to be accountable to shareholders, or they have to be accountable to charities, and foundations, or universities. They might actually have to do something that's accountable. No one wants to be accountable, Tom.

Everyone wants large sums of money to be given to them without any accountability at all. And scientists are no different. They love the idea of government funding of science, as of course, to the universities. Every grant carries 100% overheads.

And how do universities supply presidents with their yachts and other luxuries unless they have overheads and grants to feed on? And finally (and most depressingly of all) industry loves the government funding of science because it thinks – and this is wrong, by the way.

You could show that industry has got this wrong. But forgetting that, industry thinks it's getting subsidies for its research. It's thinking: *Hooray! Finally, we're getting something for our taxes*.

And so, the result is – oh, and the general public loves the government funding of science because they assume that's how you get NASA on the moon waving the American flag and making them earn American profits.

So, that must come out of the government funding of science. And all those lovely nature programs of whales and things, that must come from the government. And so, everyone believes in the government funding of science.

But the result is that no one ever questions the arguments, because that's never subjected to criticism. And the arguments always collapse on investigation, but no one investigates them. And the only people who do are people like you and me, who are what we in England call "classical liberals", who are more likely to call themselves "libertarians" in the States.

But we just don't believe that governments should fund things, including science. And so, we look at this and we find it's not true. But we are a very, very small voice in a huge storm of vested interests.

**WOODS:** A lot of follow up things that I want to ask you about here. I want to know if you think this is too cynical. There's a meme that's been circulating that says something like this: *I've tried to follow the science, but it always leads me to the money.*

Do you think that that is too cynical?

**KEALEY:** [laughing] No, no, no, no. It's absolutely how it is, at so many different levels. So, just to take an example. I wrote a book a few years ago called *Breakfast is a Dangerous Meal*.

And it purported to be – and it was, because I'm a biochemist by training – about how the biochemistry of breakfast is so dangerous. But what it really is, it was a detective story. Because the oldest scientific lie I could find is that breakfast is the most important meal of the day.

That lie is over 100 years old. And it's obvious who – I'm not going to name any of the companies. But it's obvious which companies promote that lie. It's the cereal companies and the bacon companies. And that lies over 100 years old.

And I dissected how that lie survives. And the way it survives is by very generous grants from these companies to university scientists. And these university scientists, they never actually lie. They just select the data.

I'm now very clear that everybody knows the game that they're playing. I don't think there are any innocents in this field of breakfast. And I read over a thousand papers in this field, and I thought in the end that only one actually was a lie.

The other 999 all said that breakfast is the most important meal of the day. And I pointed out there are about seven different stratagems that scientists use to try to (inverted commas) "prove" this. I'm convinced that scientists knew what they were trying to do, but they selected the data.

But what happens in a story like that, it's the same with; You must avoid fat in your diet. I mean, there were hundreds of these stories. What happens is that once the story is embedded in the scientific community, even after the initial funder has disappeared, you have all these vested interests.

And no one wants to be told in their 60s after 40 years at the NSF, at the NIH, that they actually got this wrong. So, you always give grants to the people who agree with you. You always promote people who agree with you. You always publish a paper of people agree with you.

And so, you get a self-referential cycle. And all this is ultimately driven by money. And the only way you're going to get honesty in science is by having a very wide range of funders, so that instead of a monopoly of funding, you get hugely different funders.

There's a very good man at the University of Arizona who once said: *It's technology that keeps science honest*. And that's a very perceptive remark. In the days that science was largely funded by industry, scientists were there to help promote technology.

And if you came up with an idea that was false and your car broke down or your airplane crashed, you very quickly ditched that science. But today, science is protected from the market. That's the whole point of the famous linear model, "basic science leads to applied science", is to protect scientists from the market.

And because they're protected from the market, you get these very unhealthy communities all propagating untruths, all driven by money. The only way you can get honesty is for science to be accountable to technology. And then it's tested by the market and then it stays honest.

**WOODS:** I can't remember (because it's been so long since I read your book) if this is an insight that I got from your book. But I believe you said that, yet another problem of government funding of science is that it's difficult for government officials to fund (even if they were so inclined) various different schools of thought on a question.

Because all but one of those schools of thought will turn out to be false. And then you'll have taxpayers saying: *Well, why did you fund all these dead ends?* But the thing is that in pursuing science, there are going to be dead ends.

So, what instead happens is, they find out whatever the consensus is, they throw all the money at that. And then implicitly – or, in our day and age, very often, explicitly – they denigrate everybody else as a crank: *He doesn't agree with the consensus, and we all know that that's right*.

And so, it inevitably leads to conformity.

**KEALEY:** Absolutely. I didn't put it quite in those terms. But the fact is, Tom, you're right. Government-funded science is pretty monolithic. There are certain ideas – we have an Overton Window. And there's an Overton Window in science.

And one of the extraordinary things, if you look at some of the great scientific breakthroughs, is how difficult it often is for the breakthrough scientists to get funded. So, if you look, for example, at another area of nutrition, is it fat that's bad for you or is it carbohydrate that's bad for you?

Over 30 years – so, this is very well described by Nina Teicholz in her book, *A Big Fat Surprise*, but also, Gary Taubes describes this very well in his books.

If you're a scientist who, over a 30-year period disagreed with the idea that fat was the killer, that in fact it was carbohydrate (which, of course, we now know to be largely true) you were, in fact, dismissed as a crank.

And one of the awful things that happened to one of the great (as it happens) British pioneers – but this is not a nationalist story. There was a great British scientist about 30 years ago – 40 years ago, even – who tried to show that, actually, it was sugar and carbohydrates that were the killers.

And he couldn't get funded from government, so he got, in the end, funded by industry, because there was money there. And then, of course, the government-funded scientists were: *Look, we don't have to worry about him. He's only funded by industry. He's sold out. He's a prostitute.*

So, they get you whichever way you go. And this is one of the huge flaws of the government funding science, that it is monolithic. So, you're right.

**WOODS:**  I want to go back to the breakfast question, if you don't mind. I first suspected something was up about this because I watched a video that John Stossel made about breakfast. And I wonder if maybe he was influenced by maybe some of the work you had done on it.

But is there a way that you can explain, for a reasonably intelligent layman, why your initial impression is wrong? Like, wouldn't your initial impression be, I've been lying dormant for at least eight hours, I haven't been eating, and maybe to give myself a boost of energy, I eat. Then I have a day full of energy and productivity.

Why is that instinct not right?

**KEALEY:** Well, that's a very interesting question. We know it's not right because something like half of all people are simply not hungry in the morning. I mean, most people are hungry at lunchtime and most people are hungry at dinner time. But a significant part of the population is not hungry.

**WOODS:** And by the way, because of this idea of: *Breakfast is the most important meal of the day.* You're almost made to feel like there's something the matter with you if you're not prepared to enjoy the most important meal of the day, right?

**KEALEY:** Yes. And what we're facing in the world today, of course, is an obesity epidemic. And it's really very, very wicked to encourage people to eat an unnecessary meal. No one has to go around saying: *Lunch is the most important meal of the day, or dinner.*

Because everyone's hungry then. People aren't hungry in the morning. That's the point. And the reason they're not hungry in the morning – I mean, there are exceptions, of course, there are.

But the reason so many people aren't hungry in the morning, and the reason why it's a dangerous meal, is that, in fact, you wake up because of the rise of the level of a hormone called cortisol.

Cortisol kicks in very – if you're going to get up to seven, it kicks in at about six. And as your cortisol levels rise, you wake up. It's the stress hormone. And what the stress hormone does, it not only wakes you up, but it makes you resistant (for biochemical reasons) to glucose and insulin.

So, a piece of toast eaten at seven in the morning gives you twice as high a sugar peak as the same piece of toast eaten at lunchtime. That's the difference, and it's really quite a dramatic difference, particularly in this world where something like two thirds of all adults have pre-diabetes.

Their glucose levels are already too high. These are not trivial issues, actually. So, you asked the question. Well, the reason you don't need to eat food is that you have something like three months' worth of fat dotted around your body anyway, and the body has absolutely no difficulty in mobilizing the energy it needs.

The body knows eating in the morning is dangerous because of this glucose peak, which is why so many people aren't hungry in the morning. And so, you just have to wait till lunchtime. Now, there are people who are hungry in the morning, and fine, let them eat.

I'm not saying that no one should eat breakfast. What I'm saying is you jolly well shouldn't go around encouraging people who otherwise wouldn't eat breakfast to eat breakfast, because you're doing them a grave disservice by making them eat calories that they shouldn't be eating.

**WOODS:** I think a very similar idea, then, I think related to this, is that if you're going to go to the gym, it's essential that you eat before you go to the gym. It's a very similar thing: *Whether you're hungry or not, you need to eat before you go to the gym, so that you don't exhaust yourself*. Or whatever the argument is.

Do you think the same logic applies here? If I'm not hungry, I shouldn't eat?

**KEALEY:** If you're not hungry, you should eat. Absolutely. And my understanding is that – I'm not an expert on gyms. My understanding is you're better off eating after you've been to the gym. I think exercise on an empty stomach, apparently, is more – you get you get better exercise on an empty stomach.

Obviously, that doesn't exclude a coffee or something, but I think you're better off eating after rather than before. That's my understanding. But I'm not going to pontificate on the subject of gym. What am going to say is, don't eat unless you're hungry.

And of course, the other thing about exercise, by the way – and this, I do know about. Exercise is a very, very bad way of losing weight. And one of the ironies is that people who take exercise often reward themselves with a nice snack afterwards.

And they end up putting on weight because the calories in the snack are very hard to get rid of. And exercise is a very bad way of losing weight. It's eating too much that causes you to put on too much weight. And one of the most unnecessary meals is breakfast.

**WOODS:** I love all this stuff. I've been jotting down notes here. What first made you suspect that this conventional wisdom about government funding of science was wrong?

**KEALEY:** I can tell you because it was so dramatic. I was so surprised.

So, this happened in the 1980s. And in 1985, University of Oxford, having offered Mrs. Thatcher (who was my heroine) an honorary degree, then withdrew the offer very publicly and humiliated her on the grounds that by her cuts of the government funding of science, she was destroying British science, and therefore she didn't deserve an honorary degree from the University of Oxford.

The reason Oxford had offered her an honorary degree was that she was an Oxford graduate who had become prime minister. And there's a 200-year tradition that Oxford graduates have become prime minister or given honorary degrees. So, they felt they should do that.

But when they offered it to her, the rage amongst Oxford academics that she'd had these cuts were so terrible that the university was forced to withdraw the offer. That's the story behind that. All that's very well and good.

And it so happened by chance that exactly at that period I was moving labs from Newcastle-upon-Tyne (which was about 300 miles north of Oxford) back to Oxford where I'd been previously. So, I had a foot in two different universities, Oxford and Newcastle.

And my experience at both universities was the terrible pressure on lab space. Both universities were building labs as fast as they could to try to accommodate the increased number of scientists.

And yet, they had so many scientists in both Oxford and Newcastle that they couldn't accommodate them comfortably, which was one of the reasons why I had to change universities.

So, I said to the people in Oxford – where the honorary degree had just been withdrawn. I said: *It's all very well, but where is this decline of British science? All I see in Oxford are cranes, new labs, and overcrowded labs.*

Oh, they said: *You don't understand. Oxford, Cambridge, and London, they're protected by the British government because that's the golden triangle. Go out to the provinces, it's a desert.*

Well, I went to the provinces because I was working half time in Newcastle. I said to Newcastle – they believed equally in the terrible decline of British science. And I said: *Well, where is this terrible decline?* *Everywhere I see, there are cranes and new labs going up. We're so crowded, where is this terrible decline?*

*Oh, you don't understand. For electoral reasons, the British government is protecting provincial labs. Go to the heart of British science, the golden triangle, Oxford, Cambridge, and London, and it's a desert.*

And I suddenly realized that everyone was simply inventing stories, denying the evidence of their own eyes. Because there were so concerned to portray British science as being in decline because they thought it was in their interest to do so, they just invented stories.

What no one was doing was checking these stories. And I was I was really shocked, because when I told this to people, people just basically said: I don't believe you. I've shown them.

I've said, I mean, I'd even show people in their own universities: *Look how this university is growing.* And they would say: *Well, I don't believe you. It was very, very odd.*

**WOODS:** I only recently became aware of, in psychology, the so-called replication crisis from about ten-ish years ago. Where a whole bunch of allegedly peer-reviewed papers, it turns out, reached conclusions that could not be replicated by other researchers under identical conditions.

This was a scandal, although you have to assume that if it was this bad, a lot of people secretly knew what was going on. But publicly it was a scandal.

And when I finally found out about this, and I wrote a little bit about it in my newsletter, I had people writing to me from other fields saying: *Oh, it's as bad in my field, too.*

And then I wonder, as I've endured the past three years, I think three quarters of the epidemiologists seem like hypochondriacs, and the other quarter seems like basically smart, sensible people. And I can pretty much distinguish between them after about five minutes talking to them.

But I wonder, it's almost as if there's a rot that is extremely deep in a great many academic disciplines, and the one thing they all have in common is that these disciplines, by and large, are being carried forward in settings that are largely academic.

And I wonder if that is the explanation. Am I being too much of a monist on this?

**KEALEY:** No, I'm afraid what you said is true. Replication crisis – I mean, it really is – there's an English historian Anton Howes. On his newsletter, he pointed out there's a replication crisis even in economic history.

I mean, it's absolutely everywhere, this replication crisis. And it comes back to the business of, it's technology that keeps science honest. What we have done – it all starts with John Ioannidis, who is the Stanford professor who in 2005 wrote a paper entitled, "Half of All Published Papers Are Wrong".

And we think about it – and he's right, by the way. He confirmed it. Half of all published papers are wrong. And there are other people, there's a very good group at University of Virginia and others, all of whom have piled on, all of whom have confirmed this is absolutely the case.

And the reason is this. Scientists are being funded by the government, which means by their peers, they're not being tested in their science by technology. They're being tested by how well they please their peers.

And so, you just get a self-referential group, all of whom are promoting the same story and excluding so-called heretics, all of whom are going to the government and say: *You've got to give us more money, because otherwise we don't have enough money to promote, ultimately, economic growth*.

And you just created a very unhealthy little micro-environment where truth is being sacrificed to measurable parameters such as numbers of papers and numbers of grants, all of which are determined by peer review.

But, Tom, you're right. It's a terrible state of science and it's largely funded, created by the universities on government funding of science. It's very sad.

**WOODS:** And incidentally, I would rather suspect that if I were to investigate the social sciences very closely, they would not come out much better.

**KEALEY:** They're worse. There's no question that the hard sciences, the hard sciences, physics, maths, chemistry, they are the least bad offenders, because it's difficult to select data capriciously.

But the more social the science, ie, basically, the larger the amount of data you've got to trudge through to find out what's going on, the easier it is to select your data to do P-hacking and all those other tricks that the social sciences get up to.

So, psychology is about the worst. Well, actually, I suspect nutrition is the worst, but psychology – the replication crisis is particularly bad in the social sciences. I also think, by the way, it's very bad in economics, which is the most important of social sciences, because it's the one that governments look at most frequently.

But the economists seem to have survived the replication crisis rather better than the other sciences. And the reason for that, it's so dominated by theory, and these theorists have yet to be subject to the same amount of critical pressure that empirical observations have been, that the economists so far have rather survived the replication crisis.

But my new book, which I was writing, *Economic Revolution*, I go through all the stuff about the economics of growth, people like Paul Romer and Robert Solow, pointing out that all their theories are just based on straw.

There's no evidence to support them at all. They get supported by their fellow economists for the reasons I've just described, because they're trying to persuade the government to give them money. And they try to persuade them that they know our economic growth happens.

So, there's a sort of mutual agreement that they're going to promote these ideas. But the social sciences are profoundly corrupt in this sense. You're right. Just, if you're going to trust a paper, unless it be in physical chemistry – that's probably the most honest of all the sciences.

But don't trust the psychologists unless it's been doubly proved to be correct.

**WOODS:** I'm curious to know how you think science ought to, in effect, regulate itself. That there ought to be a way that these various disciplines can sift through the true from the false, the misleading from the accurate, so that over the course of time we get a more and more accurate picture of the world around us.

Obviously, it doesn't work to have an intellectual police force policing the various scholars. Because who are these people doing the policing, and can they be relied on? But in the absence of some overarching institution, whether it's the government or anybody else, how would you, ideally, propose that science proceed, then?

In effect, it would be – this might frighten people, but more or less anarchic. I mean, the way I envision it is, there really is no "final authority". It rather is just a matter of, the good papers push out the bad ones, and we build on the good papers.

I mean, I don't think that's naive. I think that is how it would work.

**KEALEY:** Yeah, the answer to your question is you need a plurality of funders. The more people from different backgrounds are funding a piece of research, so, people from foundations, and universities, and government, and also industry – and competing companies. It's very important, competing companies.

The more likely you are to eventually come up with a story in which you can have confidence. But a scientific paper should be seen as the advocacy of an advocate in court. A scientific paper is not the product of the judge or the jury having noted all the data.

A scientific paper is a piece of advocacy, because it's so molded by all the history that the researcher brings to that study. That they are already committed – I mean, as Einstein said, it's theory that determines what we observe.

Scientists come to the story already with theories fully formed, and what they're trying to do is confirm their theories. The Popperian story – Popper was quite right, technically, but the Popperian story, that scientists go around trying to falsify it, absolutely, they don't.

They hate being falsified. Scientists are absolute verifiers. So, you just need a complete – "anarchy" is a good word, or Gresham's Law comes out in the end. But you absolutely need a free market in ideas, and you don't get a free market in ideas when you have a monolithic government funding.

**WOODS:**  I want to go back to medical research for a minute. Because I think a question that may be lingering in people's minds is, medical research seems to be uniquely an expensive undertaking. Now, maybe we're wrong to think that, but let's stipulate that it is.

And that in order to generate a profit from any medical product, I really have to be the first to market. Especially if we're going to prescind from, let's say, intellectual property laws. So, there are no patents. I have to be the first to market.

So, without some kind of government support, I might just say this is a fool's errand. Why would I devote tens or hundreds of millions of dollars and years and years of effort only to be scooped by somebody else, or to find that it was all down a dead end?

So, therefore, we have to have government support for science, because who would be foolish enough to try this on his own?

**KEALEY:** Well, you talk about how expensive medical research is. Don't forget, the pharmaceutical industry spends more on marketing than it does on research. There's an awful lot of money in the pharmaceutical industry, which is why they spend more money on marketing than research.

So, the idea that there's no money for research just ain't true. To come back to the previous argument, you do need patents in pharmaceuticals. Not because there's no incentive to do research or because people will copy your research for little.

Only because the costs of regulation are rightly – it costs something like $100 million to invent a new drug, but then it costs another billion dollars to do all the regulation because of all the safety. That's where the real problem lies, the regulatory costs, which is why you need protection against easy copying.

But the profit – I mean, the pharmaceutical industry is almost uniquely profitable It's as bad as the oil industry and the energy industry. They don't shed tears for the pharmaceutical industry, they're doing just fine, thank you very much.

And you certainly don't need government funding for science. As pointed out in James le Fanu's book, almost every advance has actually come out of the applied laboratory, over on that side. It's not come from very expensive, pure science that wouldn't have been funded otherwise.

So, your instinct may be what you suggest, but something like 10% of GDP spent on health care, that's an enormous industry, 10% of GDP. In fact, I think in America it's 14% of GDP spent on health care. If 14% of US GDP is spent on health care, there's plenty of money for research, I can assure you.

**WOODS:** I think implicit in the Enlightenment was the idea that science – well, maybe explicit. Science, as we understand it today, is superior to theology in the sense that in theology you can argue endlessly and there's no way to know who's right, and then you wind up just fighting it out.

Whereas in in science, as we understand it from Francis Bacon, well, this is just a matter of, we gather empirical data, we run experiments, and we have an objective result. And so, this is superior because this way we can reach truth in a way that's cooperative and we don't have these kinds of conflicts.

But what we see today, for example, in climate science, is that we do not have this result at all. We instead have an extreme polarization where instead of people saying: *Well, that's a really well-designed paper and it has convinced me that this is the truth.*

Instead, we have people saying: *Well, you're funded by the oil industry, or you're with the United Nations, and so you want to run the world, so of course you're going to have this conclusion*.

And so, it doesn't seem to settle anything for people. If anything, it makes people more rigid in their initial thoughts.

**KEALEY:** Well, what you say is very, very interesting. And what you say is largely true. What Francis Bacon said was false. He said that we collect all this data, then we dispassionately come up – we induce a theory, and then we deduce experiments.

And it's not true. But the trouble is, there's too much data. And that's the real problem. Scientists can't just sit there collecting data dispassionately. You're got to make adjustments as to what data is important.

I mean, when you're looking at subatomic particles, do the color of your socks matter? No, probably not, so you don't look at that data. And then, well, what data do you look at? And so, you end up pre-selecting the data even before you start designing your experiments.

And that's why there's so much bias in science. The answer to your point, Tom, is to accept that that is actually the reality. That science is anarchic, there are no ultimate truths, although after a hundred years or so, there's generally a consensus you can rely upon.

And it's always been that way, funnily enough. So, in the 19th century, for example, there was this huge argument about the age of the earth.

And essentially Christians, who wanted the age of the Earth to be as young as possible because they wanted to fit the Genesis story as much as possible, they maintained that the Earth had to be very, very young, only a few million years old, because there was a volcanic core that was red hot, and it was cooling at a certain rate.

So, the earth couldn't be much older than a few million years or we would have cooled. Whereas the atheists believed in the earth being hundreds of millions of years old. They followed the sedimentary rock data, the principles of geology data, which show that the rate of sedimentary rocks could only be hundreds of millions of years old.

And the way these two groups of scientists resolve their differences is they didn't talk to each other. They belonged to different societies, geological societies, zoological societies. They published in different journals.

When they met socially, they were perfectly polite, but they didn't engage with each other. And basically, they just waited until someone came up with the ultimate data. And the ultimate data, by the way, is that the center of the earth is red hot because of radioactivity, and radioactivity releases heat.

So, in fact, the earth (as we now know) is hundreds of millions of years old, in fact, four point something billion years old. So, it's always been the way you described. Scientists pre-select their data. They try to verify their theories.

And it's for us as consumers to try to work out what the bias is, and to try to determine where we think the truth lies. But scientists are like advocates in court. You'd be mad to believe anything that an advocate in court said about anything. He or she is clearly party pre.

You've got somehow, as a consumer of science, to be a judge and a jury yourself, which is very difficult because these are very technical areas. So, ultimately, there is no simple solution. Government can help.

And sometimes – I'm going to tell this very unpleasant story. But government can help funnily enough. And the famous story (which I'm sure you know, but just in case you don't know) is, why do we know that cigarettes cause cancer? Who was it who made that discovery?

Well, unbelievably – it's an extraordinary story. But unbelievably, it was Adolf Hitler. Adolf Hitler, when he came to power – Adolf Hitler would have fitted in very well in today's world. He was a vegan. He didn't believe in alcohol. He wanted to preserve the environment.

I mean, he was really right on, man, was our Adolf. And one of the things he didn't believe in was smoking. And when he came to power in 1933, he called all the epidemiologists together and he said: *Look, I don't believe in smoking.*

And they said: *No, it's not true. The cigarette companies have showed that you smoke a cigarette and you get a cough, and you clear out your lungs. Smoking is good for you.* Hitler was convinced otherwise, and very quickly they discovered that he was right. The data just fell out.

So, even bad people like Hitler have something useful to contribute to science. And the reason I mention this is that there is no simple solution. You asked the question, Tom, for which there is no simple answer.

So, ultimately, the more inputs into science, the more likely we are to find truth. The one thing that truth can be detected very quickly is technology. If an airplane is going to fall out of the sky, it's going to fall out of the sky. There's no doubt about that.

And so, the quicker we can test a piece of science by technology, the more likely we are to know if it's true or not. Similarly with cigarettes. Cigarettes actually caused lung cancer, you can look at these things.

But the further you are away from application of science, then the more you are in some self-referential, government funded, university lab, the less likely you are to know what's true. And entire disciplines could be completely wrong, as nutrition was for 40 years before – and the irony is that nutrition – the scam of nutrition – was smashed by three journalists.

They weren't scientists themselves, Nina Teicholz and two others, all three of whom were journalists. They talked to dissenters, but it was the journalists who put the whole story together in the end.

**WOODS:** I've been meaning to have her on my show, and I really should follow up on that.

**KEALEY:** Oh, she'd be great. She's great.

**WOODS:** Okay. All right. So, then, this is a definite. This is definitely going to happen. I rather suspect that after this conversation, people are going to feel like: *I need more Terence Kealey in my life.*

Is there a link or anywhere I can send them to where they can get more of what you have to say?

**KEALEY:** I've not been as good as I should be on social media, because I've been so busy. I've wrote a piece for the Cato Institute about six, seven years ago, summarizing the case why governments should defund science. I think that summarizes it pretty well.

And I wrote a piece for the Cato Institute about a year ago saying why this new expansion of science that the Biden government wants to do was just a complete waste of money. So, I have some stuff on various Cato websites.

I just want to add one thing. I know we're running out of time, but I just want to say one thing. What changes everything in America is Sputnik. I just wanted to get that story so that people know.

**WOODS:** Please.

**KEALEY:**  So, until the launch of Sputnik in 1957, America at every level believed in laissez-faire in science. Of course, during war time, the government has missions to build atom bombs and things. But for example, I mean, look at 1947.

You have the OSRD, this huge organization, the Office for Scientific Research and Development that, amongst other things, supports the Manhattan Project. But by 1947, it's been disbanded. The American government did not believe in the government funding of science in peacetime.

They didn't believe in it. Everything changes in 1957. The Russians launch Sputnik. America thinks it's going to be bombed by nuclear weapons from space. And at that point, America does an about face and says we need the government funding science, because the Russians have got an economic lead on this.

For the first time, the Americans thought that the Russians are going to beat America economically. It's incredible to think this now, but in 1957, people assumed that Sputnik spoke to motor cars and everything else.

And at that point, the American government essentially commissioned two very brilliant economists who – their economics was bad, I'm afraid, in this context. But Ken Arrow, who won a Nobel Prize, and Richard Nelson, a very nice man who became the darling of the economics of science.

And basically, said to them: *Look, we need papers from you that say that free markets are best at everything, except in science. We just want this one exception. The government should fund science so that we can justify our policies*.

And they produced these papers – which are completely misleading, by the way, based on complete nonsense. But they did what they were asked to do. And ever since then – and this is where you came in, Tom, right at the beginning an hour ago – even free marketeers, libertarians, have grudgingly worried that the one exception is the funding of science.

Which, by the way, means economic growth, because economic growth depends on new technology and new science. Which means that libertarians have actually been saying that the most important economic function of all, which is growth, is the gift of the government.

It's a very dangerous philosophy and it's completely wrong. Because you can show that after 1957 with this huge expansion of government funding of science, the rate of economic growth in America (or anywhere else for that matter) absolutely did not change.

It might even have gone down, but I'm not going to go that far. Let me just simply say, basic economic growth did not change. There is no evidence. Tom, there is no evidence anywhere in the world that the government funding of science has ever stimulated the country's GDP per capita.

There is no such data. And my God, people have looked for it.

**WOODS:** I'm sure they have. Well, I'm going to put some of your material linked to it in the description of this video, and also on the show notes page, which is TomWoods.com/2400, because this is episode 2400. I forgot to mention – because I got distracted by clinical biochemistry at the beginning.

I forgot to mention that you were a research fellow at the Cato Institute. And I will say that if the Cato Institute is supporting you and your work, that is one of the most meritorious things they've ever done.

And I'm just so glad I finally got a chance to talk to you. And I hope when the book comes out, we can have another opportunity and revisit some of this and go into some new topics as well.

**KEALEY:** That would be lovely, Tom. Thank you very much. And good luck to the Cato, good luck to the *Mises Institute*, and good luck to you.

**WOODS:** Thank you so much.