Ongoing dispute over the origins of COVID-19 raises a prickly question: Should consensus play a role in science?

After having been told for over a year that there was a scientific consensus that Covid had a natural origin — and that any suggestion of a possible lab leak in Wuhan was tantamount to a xenophobic conspiracy theory — it now appears that there is not, and never was, such a consensus. And the lab-leak hypothesis, which once marked any publication discussing it as fringe, has become the subject of an official presidential investigation.

To be sure, the science on this matter is no more settled now than it was before. A report commissioned by President Biden, and released in August, found conflicting assessments from U.S. intelligence agencies about the pandemic's origin. Many scientists still believe that the virus most likely emerged from human contact with some kind of animal host, and the past few months have not revealed any definitive new evidence to the contrary. What they *have* revealed is that scientific, political, and media elites have not been entirely forthcoming about the true state of the experts' knowledge of — and the uncertainty surrounding — the origin of the virus. Some appear to have actively suppressed public scrutiny of the question. At this point, we may never be able to arrive at an answer. But if the lab-leak hypothesis does turn out to be true, this episode will have done more to damage the credibility of scientific experts than any other in recent memory.

Whatever the outcome — whether we learn that the virus jumped to humans from an animal, or that it accidentally escaped from a laboratory, or we remain in a state of ignorance — the lab-leak debacle may become a potent symbol of science's crisis of legitimacy. The list of boondoggles that much of the public, rightly or wrongly, blames on "the experts" in general — from Vietnam to Iraq to 2008 — is long and growing. But the current crisis comes amid a global emergency in which medical and other scientific experts have played a role whose prominence in public life and intimacy in private life is unlike any we have seen.

What is worrisome about the lab-leak controversy therefore is not only that our public discussions and political decisions about Covid-19 may have been hampered by the experts' mischaracterization of scientific knowledge. The long-term danger is that the experts themselves have helped to undermine public trust in scientific expertise and the institutions that depend on it, at a moment when such knowledge is more deeply intertwined with our social and political life than ever before.

To help us understand what went wrong, we need to ask again what "scientific consensus" really means, and how the experts got it so wrong in discussing Covid's origins. One tempting response, particularly to those already primed to distrust elites, is to conclude that scientific consensus is inherently dangerous — little more than self-deluded group think, or a tool for manipulating the public. But that is the wrong conclusion to draw. Consensus, rightly understood, is a distinguishing feature of modern science, indispensable to its progress, and part of its well-earned authority in understanding the natural world — it deserves a defense.

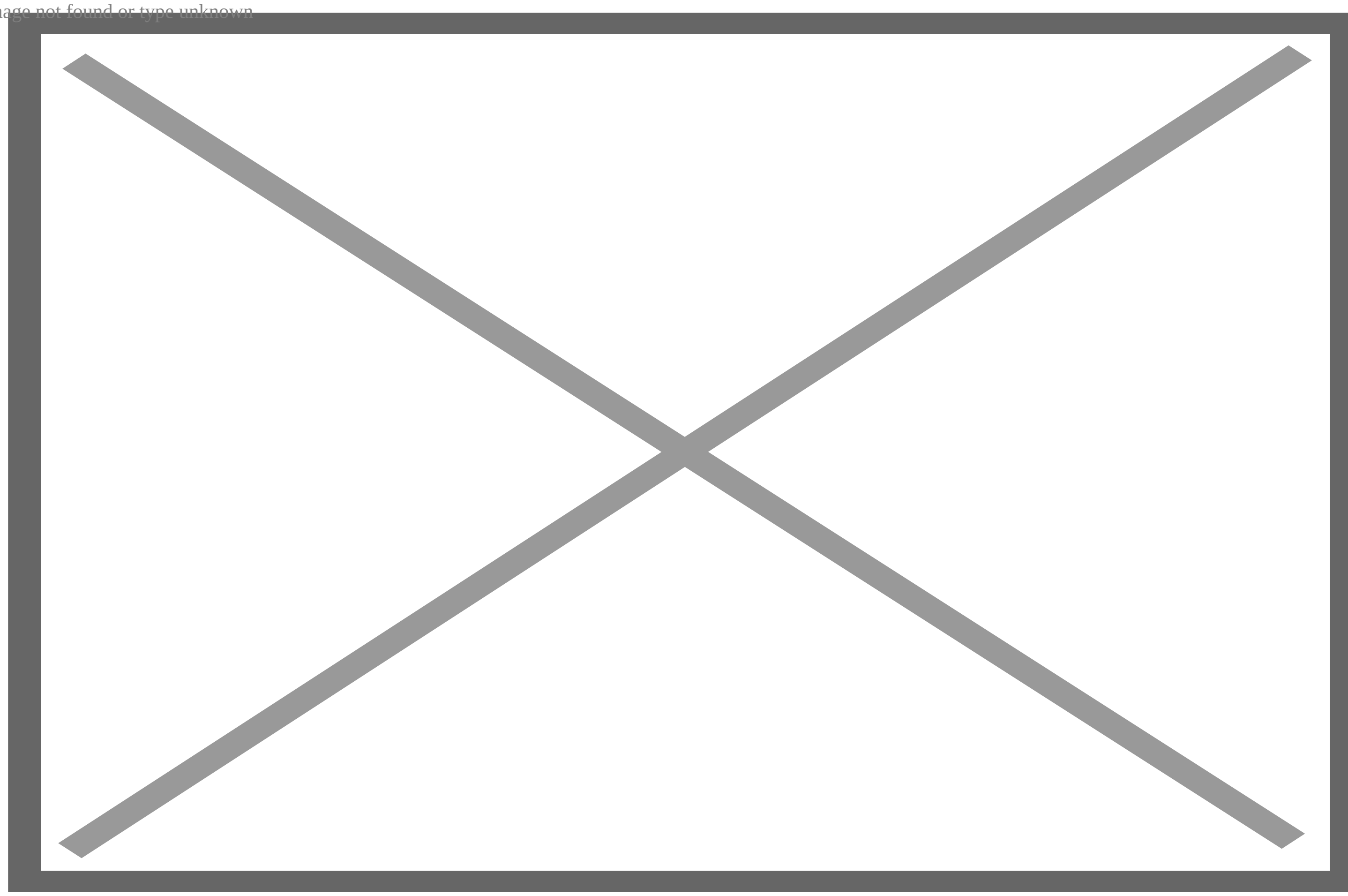
What the lab-leak controversy shows is not the danger of scientific consensus per se so much as the danger — both to democratic discourse and to science itself — when the concept of consensus gets weaponized by those seeking to exploit the authority of science to stifle public debate.

The Galilean Myth

According to one influential view, consensus should play no role in science. This is because, so the argument goes, science is fundamentally about *questioning* orthodoxy and elite beliefs, basing knowledge instead on evidence that is equally available to all. At the moment when science becomes consensus, it ceases to be science.

This view can be traced to the Scientific Revolution of the seventeenth century, with precursors among some of modern science’s founders, notably René Descartes. In the eighteenth century, it was extended and embellished by Enlightenment thinkers like Voltaire and Paul-Henri Thiry, Baron d’Holbach, who sought to use science to overthrow what they saw as the superstitious dogmas of the past. This view of science has since been kept alive by influential philosophical accounts no less than popular portrayals of renegade scientists speaking truth to power. We see its passionate democratic ideal in Mark Twain, who heaped scorn on the “breeds of Experts that sit around and get up the Consensuses and squelch the new things as fast as they come from the hands of the plodders, the searchers, the inspired dreamers, the Pasteurs that come bearing pearls to scatter in the Consensus sty.”

Image not found or type unknown



Mark Twain. Credit: Getty Images

In our own time, the “anti-consensus” view of science gets deployed alternately by progressives and conservatives when marshalling science to attack the views of their opponents. It has acquired a particular allure during the coronavirus crisis — especially for critics of the scientific establishment. To Covid skeptics, scientists brave enough to question mainstream views on masks, lockdowns, and vaccines are modern-day Galileos, counter-experts who claim the mantle of science by rejecting the consensus. At the same time, defenders of our government’s pandemic policies claim that Anthony Fauci is the real Galileo, boldly facing the onslaught of Republican politicians and an ignorant public.

But however influential, the characterization of science as fundamentally anti-consensus is largely a myth. Like all myths, it has its heroes, especially Galileo — who, having been forced by the Catholic Church to recant the Copernican theory that the Earth revolves around the Sun, is alleged to have muttered *Eppur si muove!* (“And yet it moves!”). And also like all myths, this one contains elements of truth.

Early modern science *did* break with tradition in many respects. It did so by rejecting particular scientific claims associated with medieval religion, such as the ancient geocentric model of the cosmos. Modern science also claimed autonomy from medieval religious and philosophical traditions broadly, developing into its own distinctive intellectual tradition. And, of course, scientists sometimes are and must be skeptical of received wisdom and question entrenched beliefs.

These are the aspects of modern science that get reflected — and exaggerated to the point of distortion — in popular portrayals of the lone scientific genius resisting the tyranny of consensus. The truth, however, is that while scientists may sometimes speak like Galileos, especially when they find themselves on the margins of scientific or political respectability, they rarely, if ever, act like the Galileo of myth, even when they are challenging prevailing scientific views.

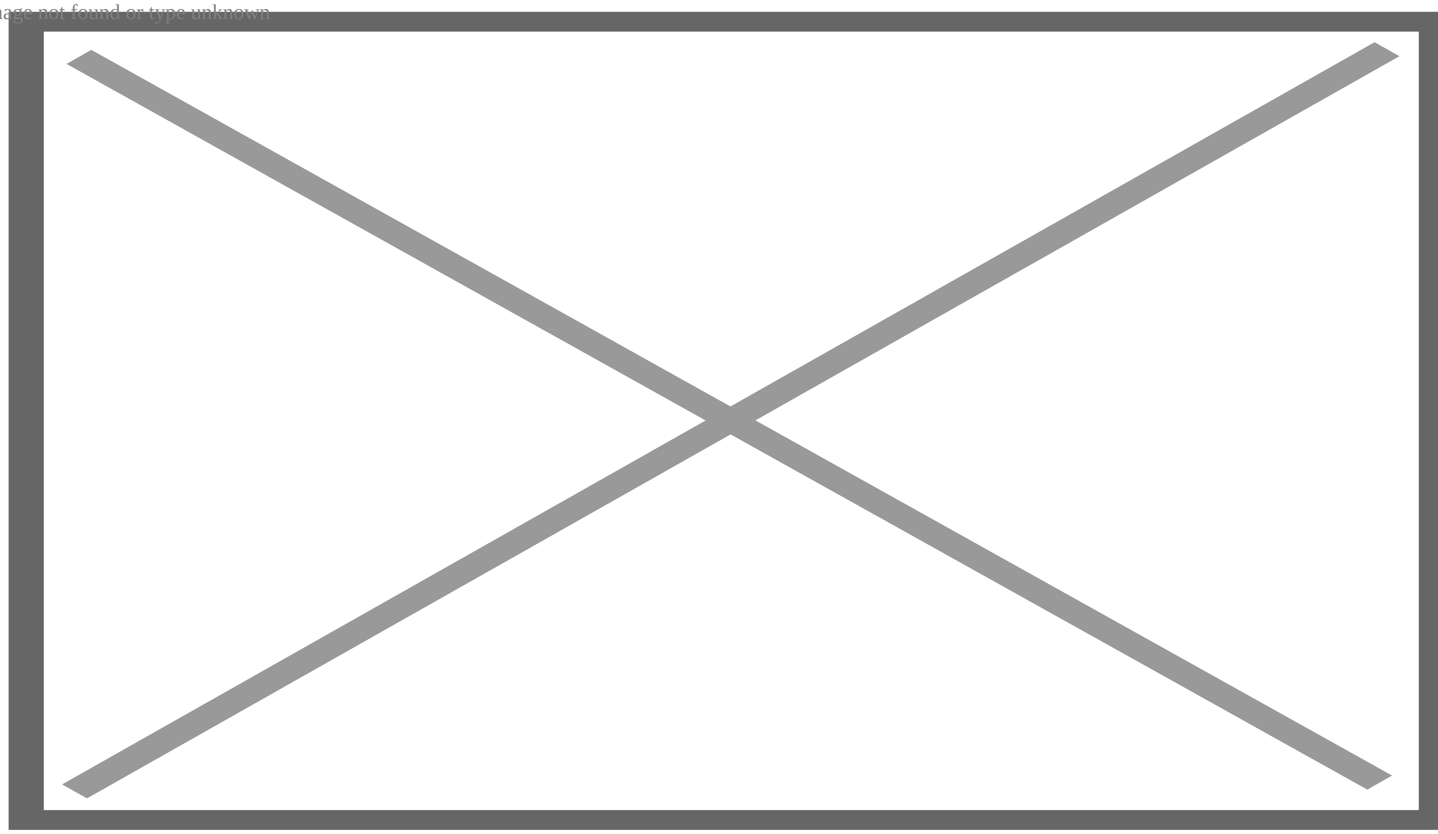
Science as a tradition

A look at how Galileo and other founders of modern science actually went about breaking with the past reveals the Galilean myth to be just that. First, these thinkers hardly rejected *all* authority; most of them, including Copernicus, Descartes, and Galileo, were religious believers. Even Newton, who did indeed break with Christian orthodoxy, for instance by denying the doctrine of the Trinity, based his faith on what he took to be an older, more authoritative religious tradition. Second, most of them relied on past philosophical and scientific traditions far more than the Galilean myth would have us believe.

Descartes, for instance, deployed the technical vocabulary and conceptual distinctions of medieval scholasticism when penning his revolutionary works. Galileo was influenced by the Parisian nominalist school of the fourteenth century, a group of medieval scientists who criticized and reformulated key aspects of Aristotle's physics, and who laid the groundwork for the modern concept of inertia. Copernicus was of course responsible for one of the greatest scientific revolutions in history. The modern sense of "revolution" — meaning a transformative change, not a circular motion — is said to originate from the title of his work *On the Revolution of the Heavenly Spheres*, which outlined the heliocentric model of the solar system. Yet some scholars believe he was influenced by ancient and medieval traditions of thought, from Neo-Platonism to the Parisian nominalists to the fourteenth-century Arab astronomer Ibn al-Shatir.

Or take Einstein, whom popular lore often portrays as the lone genius overthrowing Newtonian physics. He was indeed one of the most creative thinkers in the history of science, and a key figure in the second scientific revolution that began in the nineteenth century. But he saw his own path-breaking work as advancing, rather than overthrowing, classical physics. His special theory of relativity, for instance, unified the most prominent fields of physics at the time — electromagnetism and mechanics — by drawing out the implications of two accepted postulates (Galileo's principle of the relativity of motion and the invariance of the speed of light).

Image not found or type unknown



Albert Einstein. Credit: Getty Images

The greatest scientific innovators throughout history were not lone geniuses, radically questioning everything that came before them and building up science anew. The ideas of scientists such as Copernicus, Galileo, Descartes, and Einstein *were* revolutionary, and faced resistance from defenders of the scientific status quo. But these revolutionaries were themselves masters of past traditions, including those they helped to overturn. And many of them understood themselves as building on, rather than rejecting, what came before.

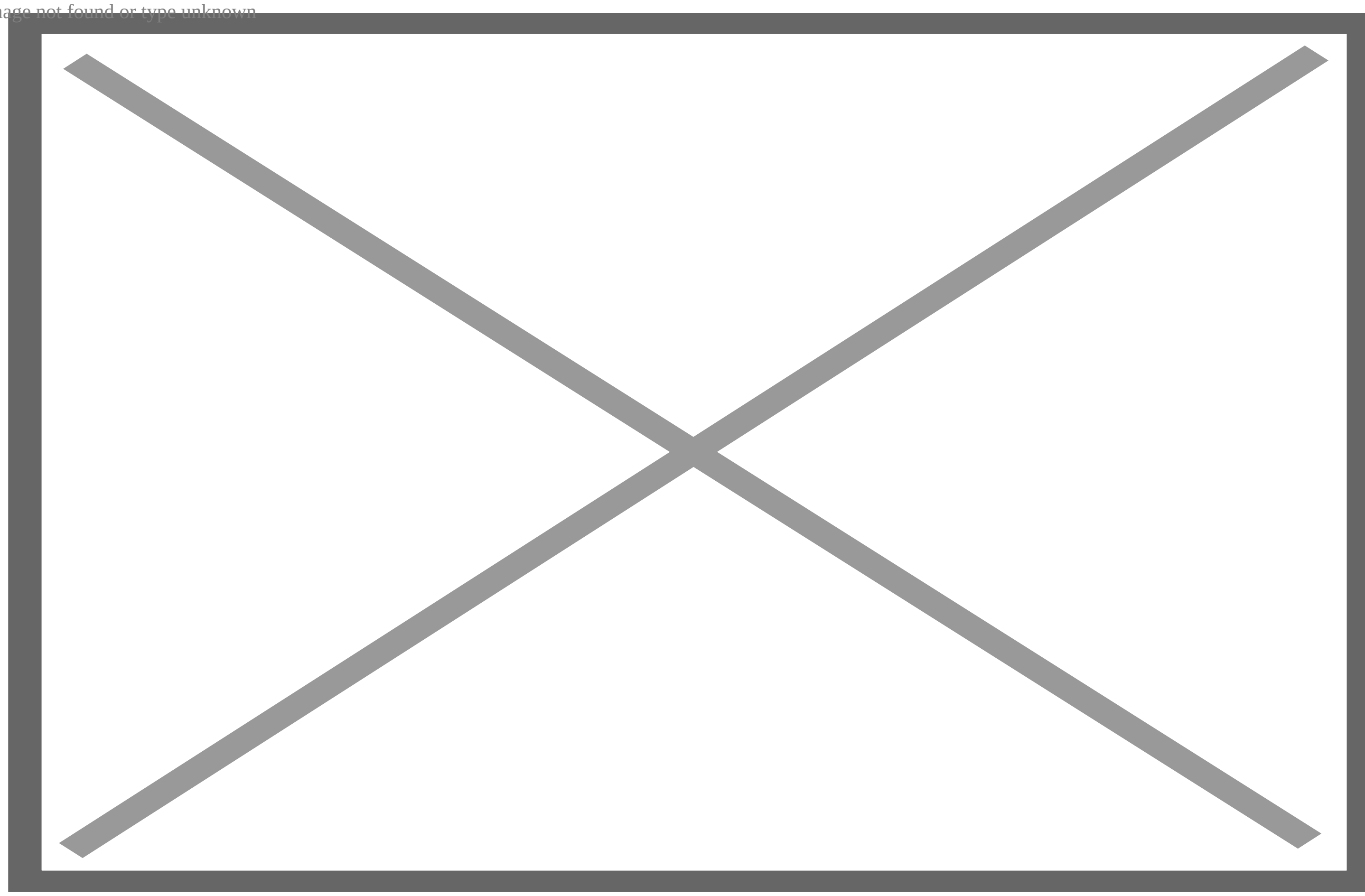
None of this should be surprising. In order to participate in or contribute to established science — much less to criticize or overthrow it — one has to have been trained in the relevant scientific fields. That is to say, one has to have been brought up in a particular scientific tradition, whether geocentric or heliocentric astronomy, or classical or relativistic physics.

Science as a collective practice

To be initiated into a tradition, one has to first submit to the authority of its bearers — as an apprentice does to the master craftsman — and to the institutions that sustain the tradition. In the natural sciences, the bearers of tradition are usually exemplary figures from the past, such as Newton, Einstein, Darwin, or Lavoisier, whose stories are passed down by teachers and textbooks. For example, first-year students of physics may be taught paradigmatic instances of scientific discovery from the history of physics and astronomy, and asked to imitate them — discoveries such as Galileo's experiments with falling objects, or Kepler's derivation of the laws of planetary motion, or Newton's formulation of the universal law of gravity.

In doing so, students are *not* formulating hypotheses on the basis of observations and then conducting experiments to test them, as the "scientific method" requires. Nor are they independently confirming scientific results by means of new experiments, as practicing scientists might do. Instead, they are being *told* by their teachers and textbooks that certain hypotheses are true — for instance, that an object's rate of fall is independent of its mass. And then they are instructed to reproduce experiments, such as Galileo's inclined plane experiment, knowing in advance that they will confirm them. Any deviations from the expected experimental outcome are attributed to error or inexperience — not to the students' having made revolutionary new discoveries.

Image not found or type unknown



Credit: News Collective

The purpose of such exercises is not to transmit bits of information — reading a book could accomplish that. Rather, it is to impart the *skills* needed to practice science, including how to run an experiment, calibrate a measuring device, interpret its results, and use these data to test a hypothesis. While such skills involve theoretical knowledge, they also depend on what scientist and philosopher Michael Polanyi referred to as “tacit knowledge” — the kind of knowledge that is implicit rather than explicit, and can only be learned by doing.

To be sure, as students grow in experience, they learn to formulate their own hypotheses and design new experiments. Along the way, they may wind up questioning or even rejecting some of what they learned in school. Eventually, they may pass from apprentices to masters — often after having spent years working in the laboratory of an already established researcher. If a student is unusually talented or lucky (or both), he or she may not only corroborate or build on past discoveries but also make new ones, transforming or even overturning existing theories in the process.

In advancing the state of the field, however, a scientist remains dependent on scientific authority in important respects. For instance, he or she will take for granted those parts of established science that go unchallenged by — or are required for — his or her research. This is what Einstein did when he accepted parts of classical physics, such as the relativity of motion, in order to draw conclusions that transformed other parts, such as Newtonian conceptions of time and space. It would be impossible for a single researcher to put to the test every single theory or hypothesis needed to conduct scientific research. It would require too much time, money, and mastery of too many kinds of expertise. Nor would it be desirable.

If every scientist had acted as Descartes advised — radically doubting everything except what can be deduced from indubitable first principles — science would never have advanced beyond “I think, therefore I am.” Even when making revolutionary advances, scientists do not generally operate like skeptics, questioning all past assumptions or hypotheses and beginning their work afresh on independently established foundations. Rather, they accept the reliability of most established scientific theories, methods, and techniques, along with the trustworthiness of their fellow scientists.

The scientific enterprise, then, is not composed of an aggregate of individual researchers locked in skeptical conflict with the prevailing consensus, as the Galilean myth has it. It is a collective practice, rooted in shared — albeit sometimes divergent or conflicting — traditions of knowledge and habits of thought, requiring a high degree of mutual cooperation and trust, even when revolutionary changes are underway. This is why consensus is so vital to science — and why the institutions of science not only can and do but *should* use their authority to enforce it.

The authority of scientific institutions

Scientific expertise is elitist, in the sense that the vast majority of us are not qualified to practice science any more than the vast majority of us are qualified to practice law or medicine or commercial aviation. As a result, most people are barred from active participation in scientific institutions —publishing in scientific journals, presenting at scientific conferences, and teaching university-level science courses. The barriers to entry into science are, and ought to be, high. This is not what makes science unique; it's what makes it a form of expertise like any other.

One of the things that doesmake science unique, however, is the role that consensus plays in establishing these barriers. A scientific consensus helps to define a given field or subfield. It determines what kinds of questions are genuine scientific questions and which are not; which topics are in bounds and which are out; which methods are appropriate and when; what kinds of empirical data are counter-instances to established theory or anomalies yet to be explained. This brings out what is one of the most important, if overlooked, functions of scientific institutions: gatekeeping.

The great majority of opinions and conjectures, including even scientific ones made by trained scientists, have no place in a mature field, at least once a consensus has been well-established. In this sense, a scientific consensus rules *out* as much — perhaps much more — than it rules *in*. Reputable physics journals do not publish geocentric theories of the solar system, for instance, no matter how sophisticated the arguments, how well-credentialed the authors, and how reliable their data. Nor do they publish refutations of such theories — this would already be giving them too much credence.

Heliocentrism has been the consensus view for centuries (although geocentric models are still useful in many practical contexts, such as navigation). At a certain point in the sixteenth century, there were various alternatives on the table — the mainstream geocentric view, its heliocentric rival, and others, such as the view promoted by Tycho Brahe that combined elements of both. But the heliocentric model has long since been well-established — and refined and improved — and is now deeply integrated into other well-established theories and, indeed, our worldview. It would — and should — take a whole lot more than a recalcitrant observation or sophisticated theoretical argument to get scientists to abandon it, or even to consider alternatives.

Image not found or type unknown

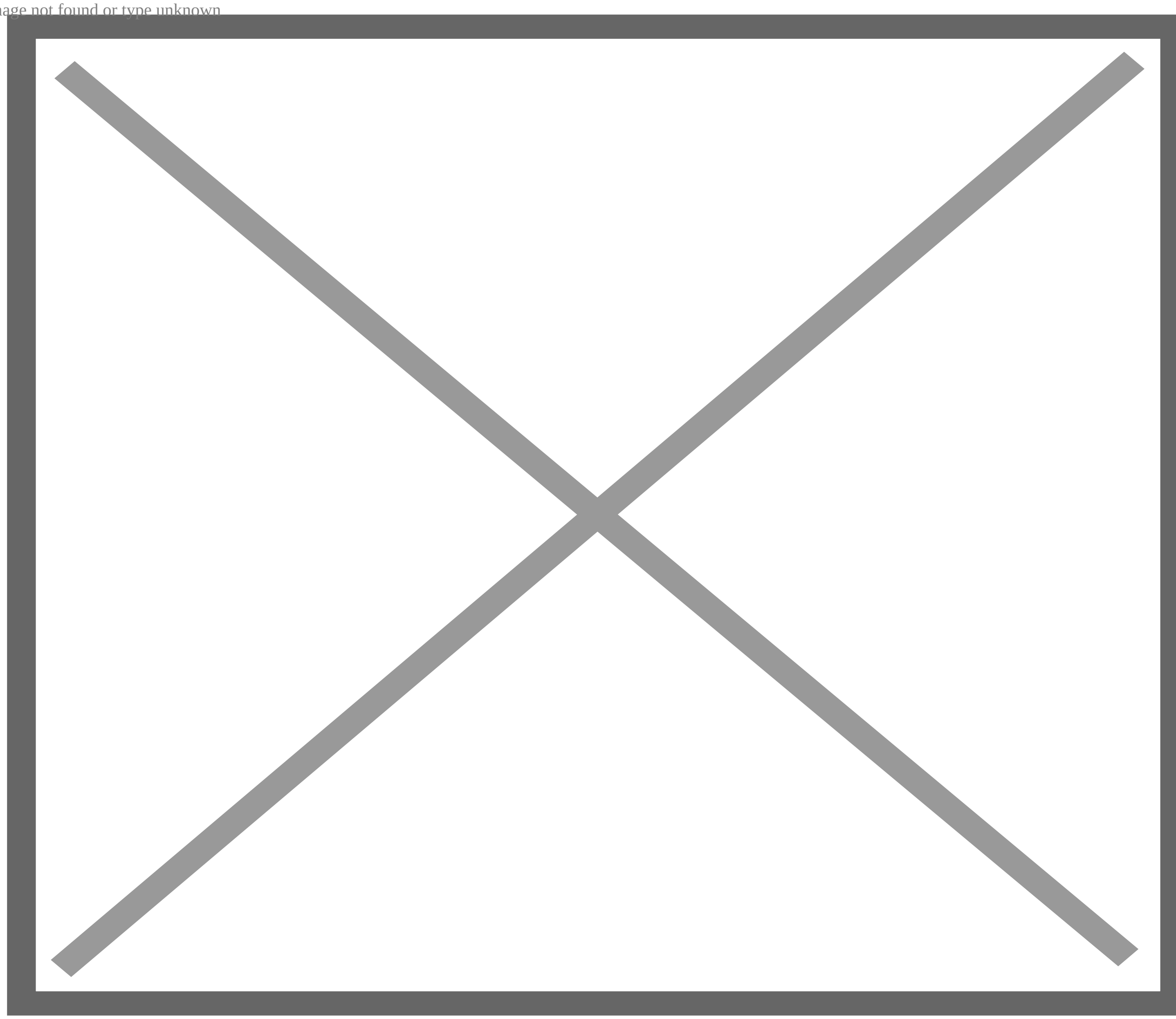


Illustration of the Copernican system, from the Harmonia Macrocosmica. Credit: Andreas Cellarius

Heterodox views, whether geocentrism or cold fusion or parapsychology, do of course get published in fringe journals. Some of their contributors may be well-credentialed, and their arguments may appear scientific, especially to the non-expert — with mathematical equations and appeals to empirical evidence. Such scientists usually have their own professional institutions — societies, conferences, and publications — that often resemble mainstream ones, at least to untrained eyes. (This makes bright-line demarcations between science and “pseudoscience” harder to draw than we might like to believe.)

What is striking, however, is that the arguments presented in these venues are almost never refuted by mainstream scientists. They may be publicly denounced, but without elaborate argumentation in professional journals. Most of the time, they are simply ignored. This, of course, only reinforces the perception of the fringe scientists that their views are unfairly maligned by the majority — that they are the true Galileos challenging the consensus. But when it comes to well-established scientific theories, mainstream scientific institutions have little choice but to ignore the vast majority of fringe ideas. Science could never advance if it had to re-establish every past theory, counter every objection, or refute every crank. This is true in spite of the fact that a consensus may well turn out to be wrong, incomplete, or in need of revision.

This grates against our democratic ears — we instinctively side with Twain's "inspired dreamers." Yet most of us accept it as a matter of course. Whenever we say that we believe, or dismiss those who doubt, that the Earth revolves around the Sun, or that the universe is not thousands but billions of years old, or that water is composed of one oxygen and two hydrogen atoms, or that evolution takes place through natural selection, we are implicitly accepting the authority of scientific consensus and the scientific institutions that enforce it — that is, unless we can carry out the relevant demonstrations, experiments, or empirical observations ourselves.

Our situation, in other words, is one of *dependence* — on the testimony and thus the authority of others. This is true for many of our beliefs, not just scientific ones. How do you *really* know, for example, what city you were born in? What is unique about our dependence on scientific experts is that much of the time, we are not and could not be in a position to confirm whether their testimony is reliable. We are not utterly or helplessly dependent. We can, for instance, critically assess whether scientific experts seem credible or trustworthy, as we do with anybody else on whose testimony we rely in our ordinary lives. But to really *know* whether a scientific claim is true we would have to become experts in, or at least intimately familiar with, the relevant fields ourselves.

Yet acquiring such expertise is almost impossible for most of us, who lack the ability or time or resources to do it. And no one — including scientists themselves — has the ability or time or resources to acquire expertise in every scientific field. As a result, all of us — scientific experts and non-experts alike — are unavoidably dependent, at least to some degree or another, on the authority of scientific experts and the institutions, such as universities, journals, and professional societies, that express the scientific consensus in a given field.

An 'essential tension'

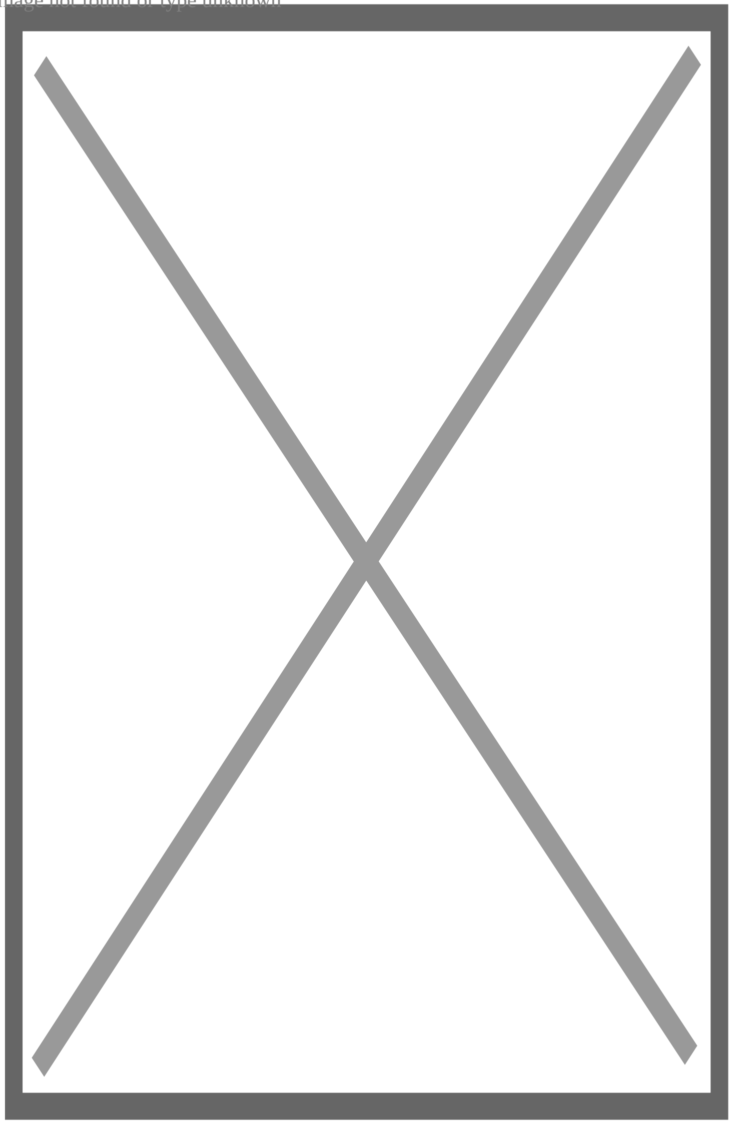
What a scientific consensus provides — with the aid of authoritative scientific institutions — is a relatively stable framework, held together by mutual trust, within which scientists can advance knowledge. This is what historians and philosophers of science call a "research program" or "paradigm."

A scientific paradigm is a set of beliefs and background assumptions, not only about particular theories (like special relativity) and hypotheses (like the invariance of the speed of light), but also about methodologies and skills (such as experimental or mathematical techniques), and even about philosophical postulates (such as the idea that every event is determined by prior causes). All this gets transmitted to the next generation of researchers by enculturation into a scientific tradition. Thus understood, a scientific consensus cannot be achieved, maintained, and transmitted without the authority of scientific institutions.

But that does not mean that scientific authorities are infallible, as we well know from history. A scientific consensus may need to be revised, or even rejected. This is what happened to the geocentric model of the cosmos, which was replaced by the heliocentric one, and to classical physics, which was challenged and then reinterpreted by relativistic and quantum physics.

To be sure, such reforms and revolutions can only happen if some minority of scientists breaks with prevailing views and poses new problems, or new methods for solving old ones, or if they make bold new conjectures, or combine old theories in creative new ways. Yet such ruptures are, well, disruptive, even painful, potentially requiring wholesale rejection or revision of past theory and practice. It is no surprise that scientific institutions tend to resist them. The bar for throwing out battle-tested theories is high, and ought to be.

The possibility of revolutions in science means that some of today's scientific consensuses may someday be rejected. It may even turn out that some of today's fringe scientists really are tomorrow's Galileos. Historically, scientists who have successfully challenged scientific orthodoxy were often treated as cranks, at least initially. But, however important for the advancement of science, such revolutionaries are exceedingly rare. And much scientific progress happens during periods of relative calm — what historian of science Thomas Kuhn referred to as "normal science." Science would break down if its institutions opened the door to every would-be Galileo.



This delicate balance between tradition and revolution, stability and instability, stasis and change, orthodoxy and heterodoxy, is what Polanyi called “purposive tension” and Kuhn called the “essential tension” in science. It is what gives modern science its characteristic dynamism. And it is the job of scientific institutions to ensure that the tension remains productive. They must be at once *flexible* enough to accommodate both piecemeal and large-scale change, and *strong* enough to resist corrosive forces that would undermine scientific progress.

To strike this balance, scientific institutions must maintain and enforce standards and ensure that scientists are held accountable to them — which requires that the institutions retain sufficient authority, that they are recognized as legitimate by scientists and non-scientists alike.

Why consensus is rare

Viewed in this light, consensus is not what stifles science but part of what makes it progress — and lends it its unique epistemic authority. Long before it had demonstrated its technological power — before electrification and radio and atomic weapons and computing — modern science, especially classical physics, stood as an exemplar of the kind of knowledge that could command common assent. This was a striking contrast to traditional philosophy and theology, which was and remains riven by disagreement and competing schools of thought. But while the achievement of consensus is characteristic of modern science, it does not characterize *all* of science — or even most of it.

There is typically no consensus in an immature field or subfield, for example when empirical data are sparse, or the boundaries of the field are still fuzzy, or methods and standards of evidence remain in dispute. Consensus is also frequently lacking in the social sciences, such as economics, psychology, and sociology, and in well-established interdisciplinary fields, such as environmental science and public health. This is not to say there is never consensus within these fields. But there *are* often deep, even irreconcilable disagreements within them, and rival schools of thought — about what kinds of methods are appropriate, say, or which theories are supported by the evidence, or what standards of evidence to use, or even whether the field in question should be understood as a science at all. For example, sociologists disagree about whether their discipline is a science, public health experts clash over what kind of evidence should be used to assess medical interventions, and psychologists argue over the merits of various statistical techniques.

Such disputes and divisions are less common in the natural sciences. You will not hear chemists debating whether chemistry is a science, or physicists arguing about whether calculus is an appropriate mathematical tool. Notably, this was not always so: The scientific status of what came to be called chemistry *was* in dispute prior to Lavoisier, and calculus was controversial when it was first introduced in the seventeenth and eighteenth centuries. These consensuses had to be won, as all do.

Even within our most well-established branches of natural science, consensus is not guaranteed. There is no consensus today in theoretical physics about whether string theory is a satisfactory unification of quantum and relativistic physics. Nor is there a consensus in evolutionary biology about the extent to which random genetic drift can account for evolutionary changes. From this perspective, a scientific consensus looks like a rare and precious thing. It is perhaps the exception rather than the rule in science — especially if by “science” we mean to include not only the natural but also the various human, social, and medical sciences.

‘Consensus’ without consensus

Yet, the achievement of consensus within science, however rare and special, rarely translates into consensus in social and political contexts. Take nuclear physics, a well-established field of natural science if ever there were one, in which there is a high degree of consensus. But agreement on the physics of nuclear fission is not sufficient for answering such complex social, political, and economic questions as whether nuclear energy is a safe and viable alternative energy source, whether and where to build nuclear power plants, or how to dispose of nuclear waste. Expertise in nuclear physics and literacy in its consensus views is obviously important for answering such questions, but inadequate. That’s because answering them also requires drawing on various other kinds of technical expertise — from statistics to risk assessment to engineering to environmental science — within which there may or may not be disciplinary consensus, not to mention grappling with practical challenges and deep value disagreements and conflicting interests.

It is in these contexts — where multiple kinds of scientific expertise are necessary but not sufficient for solving controversial political problems — that the dependence of non-experts on scientific expertise becomes fraught, as our debates over pandemic policies amply demonstrate. Here scientific experts may disagree about the meaning, implications, or limits of what they know. As a result, their authority to say what they know becomes precarious, and the public may challenge or even reject it. To make matters worse, we usually do not have the luxury of a scientific consensus in such controversial contexts anyway, because political decisions often have to be made long before a scientific consensus can be reached — or because the sciences involved are those in which a consensus is simply not available, and may never be.

To be sure, scientific experts can and do weigh in on controversial political decisions. For instance, scientific institutions, such as the National Academies of Sciences, will sometimes issue “consensus reports” or similar documents on topics of social and political significance, such as risk assessment, climate change, and pandemic policies. These usually draw on existing bodies of knowledge from widely varied disciplines and take considerable time and effort to produce. Such documents can be quite helpful and are frequently used to aid policy and regulatory decision-making, although they are not always available when needed for making a decision.

Yet the kind of consensus expressed in these documents is importantly distinct from the kind we have been discussing so far, even though they are both often labeled as such. The difference is between what philosopher of science Stephen P. Turner calls a “scientific consensus” and a “consensus of scientists.” A *scientific consensus*, as described earlier, is a relatively stable paradigm that structures and organizes scientific research. By contrast, a *consensus of scientists* is an organized, professional opinion, created in response to an explicit political or social need, often an official government request.

This second type of consensus is more like a decision by committee. It is second-order, so to speak: It represents a deliberate expression of collective judgment on the part of a scientific institution about how the available scientific research or evidence, often from many different fields, pertains to a given question or policy.

Whatever the value of such expert opinions, they are not the same as a scientific consensus of the kind that characterizes fields such as particle physics or molecular biology — the kind that is the well-earned source of modern science’s epistemic authority. A consensus of scientists can and often will draw on fields in which there are scientific consensuses. But an expert opinion expressing a second-order judgment about whether and how such knowledge bears on a particular policy matter is not the same thing as a scientific consensus. Moreover, the existence of such a second-order consensus does not necessarily settle disagreements in the contentious realm of politics, when much more than scientific evidence is at stake, when facts may be in dispute and values in open conflict. As we saw above, even a scientific consensus rarely does that.

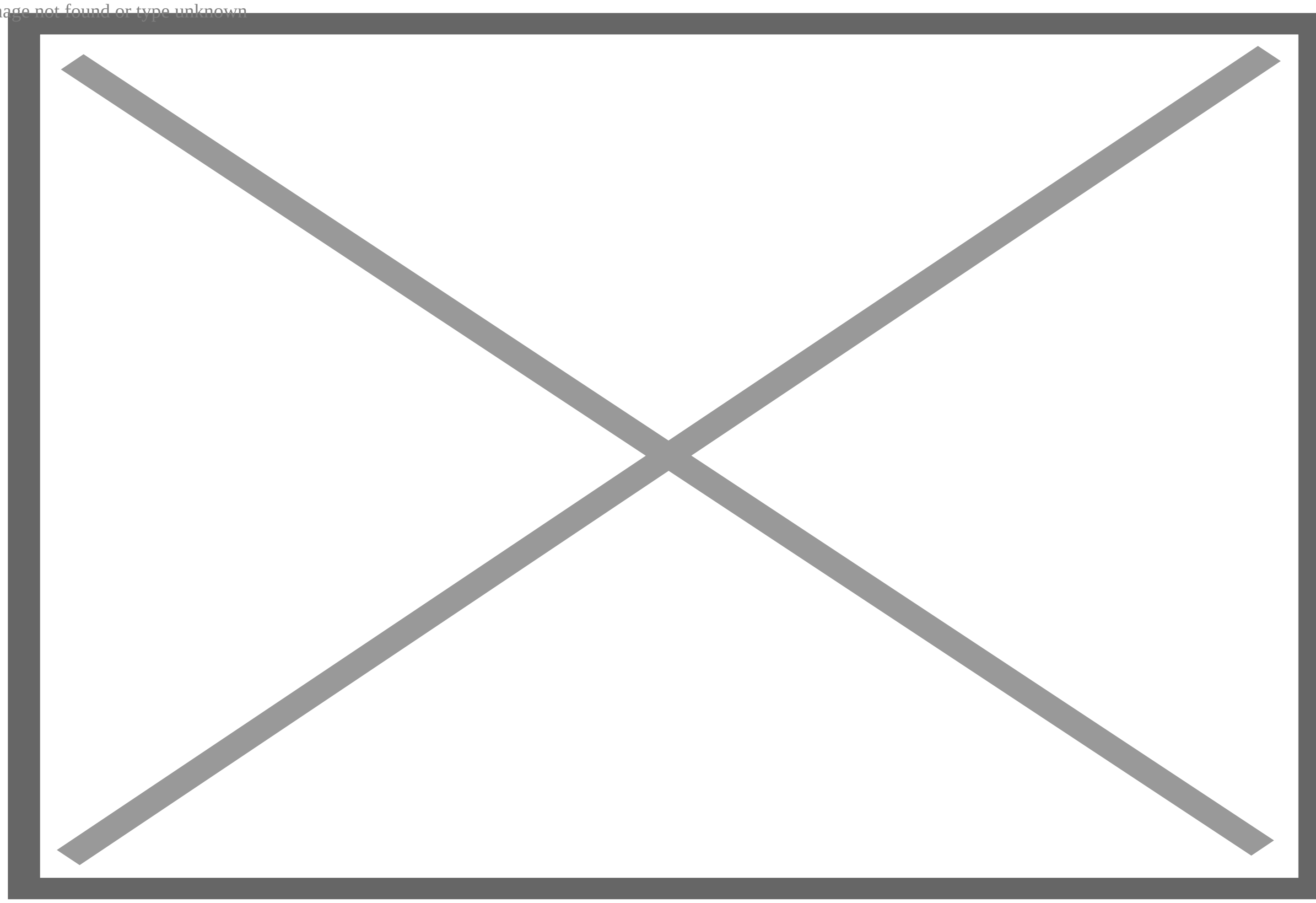
And this, at last, brings us back to the lab-leak controversy.

The ‘natural origin’ consensus that wasn’t

From the early days of the pandemic, we were told that there was a scientific consensus that Covid had a natural origin. Scientific institutions and popular media promoted the claim, while social media platforms banned dissenting views as "misinformation." Most prominently, a February 2020 letter in the prestigious scientific journal *The Lancet*, by a group of twenty-seven well-credentialed scientists, claimed that the experts who analyzed the virus "overwhelmingly conclude" that Covid-19 had a natural origin. The authors went further, condemning any suggestions that the virus might not have a natural origin as "misinformation" and "conspiracy theories" that encourage "prejudice."

It was later revealed that the scientist who organized this letter, British zoologist Peter Daszak, failed to disclose a rather significant competing interest: He is the CEO of EcoHealth Alliance, the non-profit funded by the U.S. National Institutes of Health that has supported controversial research at the Wuhan Institute of Virology, the Chinese lab that is the prime suspect for a possible leak. According to a June investigative piece in *Vanity Fair*, Daszak not only failed to disclose this connection, but did so "with the intention of concealing his role and creating the impression of scientific unanimity." And we now know, based on a series of in-depth journalistic reports and publicized emails between Anthony Fauci and other experts, there was — and still is — far more uncertainty about the virus's origin than that *Lancet* letter led us to believe.

Image not found or type unknown



Peter Daszak, president of EcoHealth Alliance. Credit: Roshni Khatri

As NBC News has reported, on January 31, 2020, Kristian Andersen, an infectious disease expert at Scripps Research in California, wrote an email to Fauci raising the possibility that the virus had been "engineered." Just four days later, in an email offering feedback to a National Academies of Sciences letter, Andersen called such ideas "crackpot theories." The "data," he now said, "conclusively show" that the virus was not engineered, neither for research nor for "nefarious reasons." Commenting on his own rapid about-face, Andersen later wrote: "We seriously considered a lab leak a possibility," but "significant new data, extensive analyses, and many discussions" led him and his colleagues to reach a different conclusion. "What the email shows, is a clear example of the scientific process."

This line continues to be parroted in the mainstream media. But one does not need to be a scientific expert to recognize that this is not the scientific process at work. At least, it is not the same scientific process that produced the scientific consensus surrounding heliocentrism or relativistic physics or the modern evolutionary synthesis. These are the kinds of consensus that scientific institutions can and should enforce, ones which, once established — and it usually takes a little longer than four days — are difficult to overturn. What we had in February 2020 appears, instead, to have been a *forced consensus* — a contestable characterization of scientific knowledge foisted prematurely onto the public by a small number of scientific experts and policed by the media.

In retrospect, the claim that there was a scientific consensus about the origins of the virus should have been surprising on its face. As we have seen, a consensus is a rare achievement in science, and hard-won at that. It can take years or even decades to form. So how could there have been a scientific consensus about the origins of a virus whose existence was unknown less than two months prior? Certainly, this was no scientific consensus, if by that we mean the kind that is characteristic of modern science and the source of its unique authority.

Perhaps this is unfair. Perhaps the relevant notion of "consensus" is not that of a scientific paradigm but rather the kind of "consensus of scientists" described earlier — a collective expert judgment about available scientific evidence. Indeed, there was scientific research, especially genomic analyses, that suggested a natural origin as early as February 2020. And many scientists agreed with this assessment then, and still do now.

But if *that* is what the experts meant by "consensus," then it's a lot harder to see why dissenting views should have been treated not merely as minority opinions but utterly beyond the pale. What's more, even if scientific opinion *had* been unanimous about the evidence that was then available, this would hardly have amounted to a consensus of any meaningful sort, given how very little evidence there was. Consider just a few of the reasons why not.

First, the experts began making pronouncements about a scientific consensus before there was any official investigation into the origins of the pandemic — roughly a year before the World Health Organization even started its official inquiry. (The WHO's director-general later said he believed there had been a "premature push" to rule out the lab-leak hypothesis, and described the official investigation as not "extensive enough.") It's hard to imagine an ordinary research scientist trumpeting a scientific consensus about a hypothesis that had yet to be systematically investigated — and castigating anyone who doubted it as a xenophobic conspiracy monger — even if he could point to some suggestive analyses. Second, key pieces of empirical evidence were lacking in early 2020. For instance, epidemiological data on early cases in Wuhan were not then available — nor indeed are they now, since the Chinese government has refused to share them with the WHO. Third, scientists who posit a natural origin of the virus have theorized that it likely arose in a bat, but also that the first human likely did not get directly infected from a bat — meaning there should be an intermediary host animal. But no such animal had been identified then — nor has it since.

Given the evidence available in February 2020, it would have been perfectly reasonable for scientific experts to formulate conjectures or make predictions or to express informed opinions about the origins of the virus. And it would have been (and remains) perfectly reasonable for experts to articulate why certain opinions or conjectures appear less probable than others, and to inform the public and to advise lawmakers accordingly.

This is much closer to the spirit of the short letter that the National Academies of Sciences sent to the U.S. Office of Science and Technology Policy on February 6, 2020. While stating that “the closest known relative” of the virus “appears to be a coronavirus identified from bat-derived samples collected in China,” it also explained that “additional genomic sequence data … are needed to determine the origin and evolution of the virus.” (Oddly enough, this letter was prominently cited in the *Lancet* letter as providing further support for the “overwhelming” conclusion that the virus had a natural origin.)

Grasping for authority

Consensus formation is messy, but scientific history is written by the victors. The consensus is the finished product, which gets printed in textbooks, taught in schools, cited in scientific reports, and popularized in the media. The messy history that gave rise to it gets papered over. Rather than rival scientific theories and clashing standards of evidence, we get a triumphalist narrative in which the consensus appears as the inevitable outcome of linear scientific progress. From a distance, the process appears neat and tidy. “Distance lends enchantment,” as the sociologist of science Harry Collins puts it.Most of the time, this distance between the messy reality of scientific practice and its polished public image is no cause for concern. Scientists and scientific institutions — particularly in such fields as physics, astronomy, chemistry, and biology, in which there is often a high degree of consensus — have accrued considerable authority and thus credibility over the course of centuries. In those fields, we don’t necessarily need or even care to know all that goes into the research that leads scientists to reach a consensus. One reason for this is that the consequences of such research rarely affect ordinary citizens directly. The chemical composition of distant stars, the breeding patterns of whales, the age of the universe — such bits of knowledge tell us much about the natural world we inhabit, but they don’t impact our daily lives, at least in any immediate way.

With the pandemic, this distance collapsed. Not only did decisions have to be made quickly, without awaiting a scientific consensus, but countless scientific fields and subfields had to be called upon at once, making expert disagreement almost unavoidable. Moreover, unlike in theoretical physics or astronomy, getting the science right during a pandemic *does* matter for our everyday lives — indeed for our very lives

— making public scrutiny both necessary and unavoidable. At the same time, the authority of traditional scientific institutions such as journals has weakened, as they have sought to adapt to the pace of shifting circumstances by encouraging faster publication. "Fast science" has resulted in the wide availability of research that has not been vetted by the standard processes of scientific evaluation, accelerating the proliferation of scientific information, both genuine and counterfeit, and narratives contrary to mainstream scientific and political views. If distance lends enchantment, proximity lends disenchantment, even resentment.

What we have seen with the lab-leak controversy is experts responding to this state of affairs not with the kind of humility the situation calls for, but by forcing consensus to create the appearance of certitude in order to preserve their social and political authority. The misrepresentation of the state of our knowledge regarding Covid's origins was therefore not simply a misstep or institutional failure. It was a perversion of the norms that scientific institutions and experts are supposed to uphold.

In our frustration at the scientific establishment, we must remember that skepticism in science has its limits, and that there are moments where science's integrity must be protected by enforcing consensus. But this was not one of them. Ironically, the experts who trumpeted a natural-origin "consensus" to bolster their credibility instead lost it. We hear constantly today, and rightly enough, that trust in scientific expertise is under assault. Too often during Covid, the assailants have been the experts themselves.

M. Anthony Mills is a senior fellow at the American Enterprise Institute and a senior fellow at the Pepperdine School of Public Policy.

A version of this article was originally posted at the New Atlantis and is reposted here with permission. The New Atlantis can be found on Twitter @tnajournal