

The Paradox of Consensus

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The Paradox of Consensus

There is no science – indeed, no knowledge generally speaking – ***without*** consensus.

There is no science – indeed, no knowledge generally speaking – ***with*** consensus.

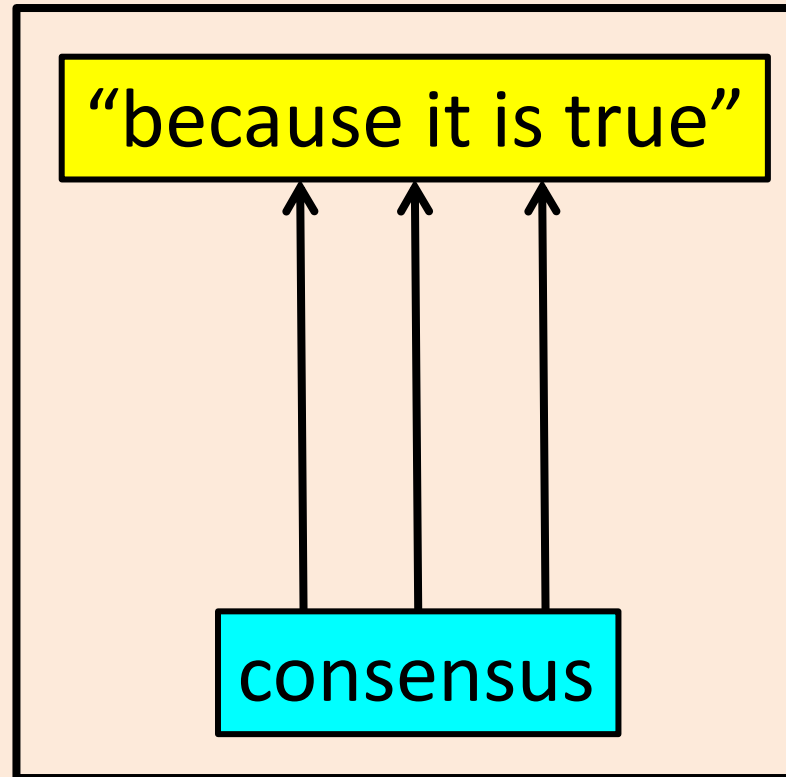


The Paradox of **Consensus**

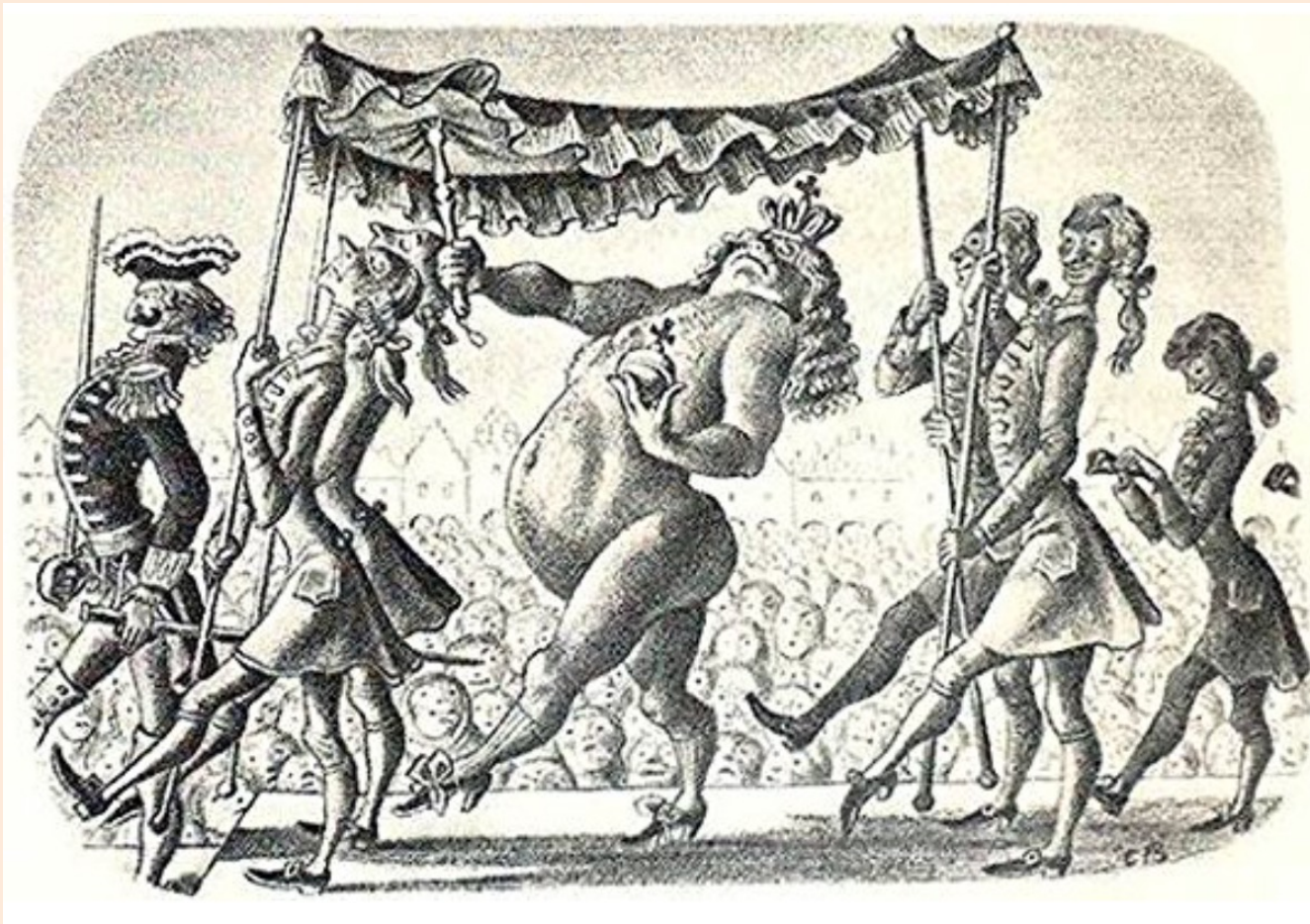
“consensus” (Latin: *consentire*,
“to feel with,” OED)

Consensus: the *public expression* of belief
or opinion about some state of affairs,
assessed as the *majority view*
within a sampled population.

Why should “public expression” concern us?



Consensus as *publicly expressed* majority opinion may have many causes *other than truth*.



Hans Christian Andersen (1837) knew why.



Joseph Stalin knew why, which explains how his opponents ended up dead or in the Gulag.



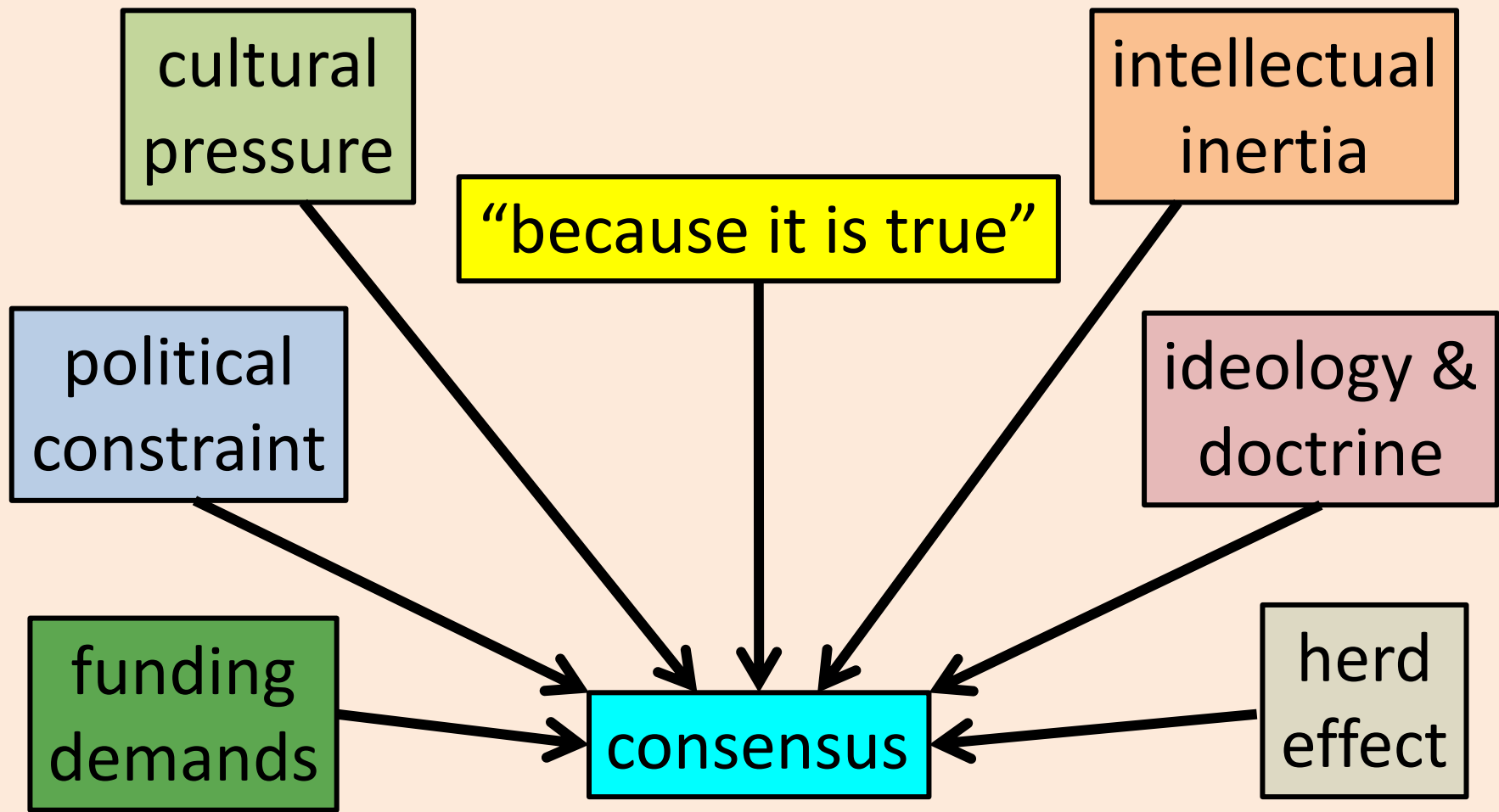
This guy (i.e., the one waving to everybody) knows why.



How likely is it that a physicist, a mathematician, or a philosopher of science, *circa* 2021, would begin his published work with this very pointedly specific dedication?

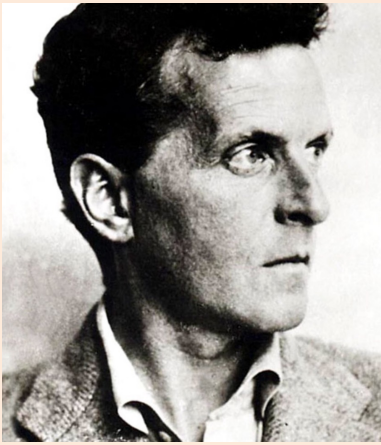
“To the Wisest and Most Distinguished Men,
the Dean and Doctors of the Faculty of
Sacred Theology of Paris, René Descartes
Sends Greetings”

Meditations on First Philosophy, 1641



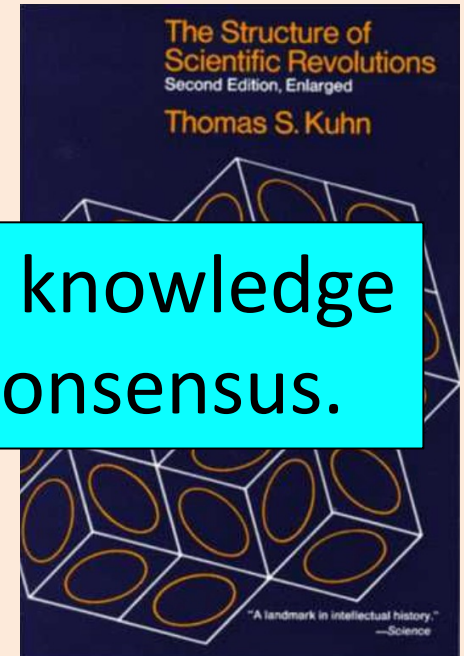
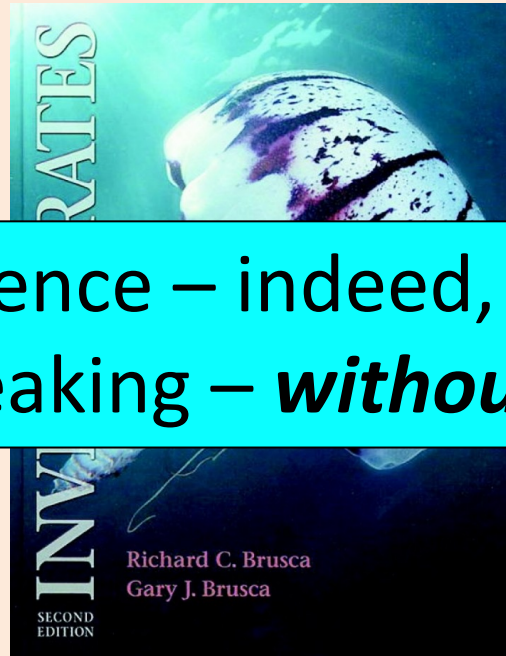
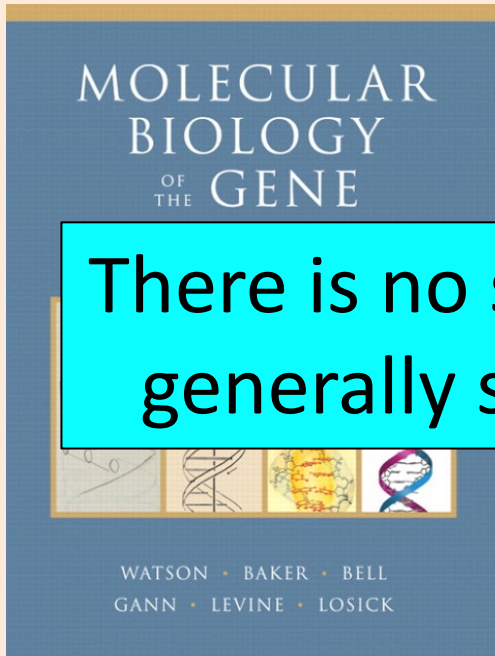
Consensus, because its possible causes are many, is at best an equivocal indicator of truth. Consensus is only that: what most people ***say*** that they ***think*** about something.

And yet...



“Something must be taught us
as a foundation.”

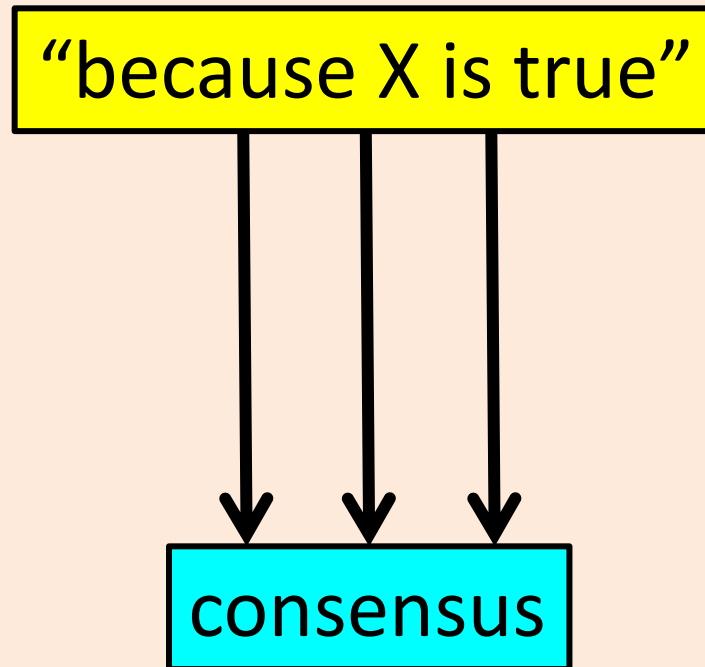
L. Wittgenstein, *On Certainty* (449)



There is no science – indeed, no knowledge
generally speaking – ***without*** consensus.

These texts and dozens of others which Paul used during his education represent propositional content judged worthy of careful study by academic disciplines (in this case, the communities of molecular biology, invertebrate zoology, and the philosophy of science) – in other words, by “the consensus.”

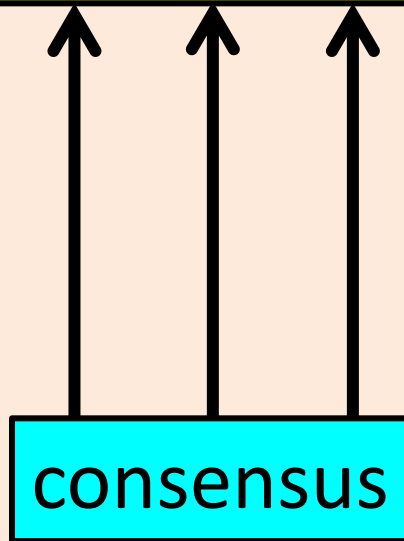
Here, the arrows of entailment are pointing in the right direction.



Ideally, consensus would represent the downstream social consequence of finding truth.

TRUST THE CONSENSUS:

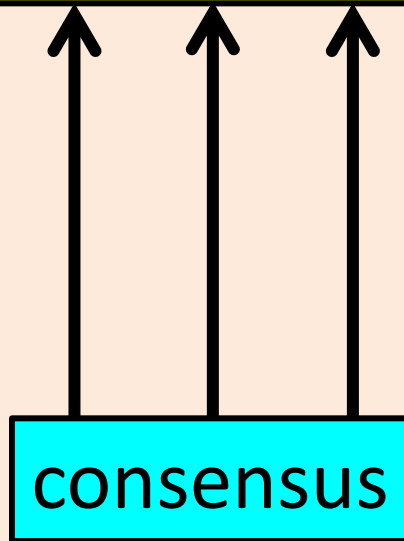
“Those who are smarter and better informed than you are *know what is true.*”



But these arrows (i.e., the direction) of epistemic support ***cannot be turned around*** – to do so would be affirming the consequent, a logical fallacy.

TRUST THE CONSENSUS:

“Those who are smarter and better informed than you are *know what is true.*”



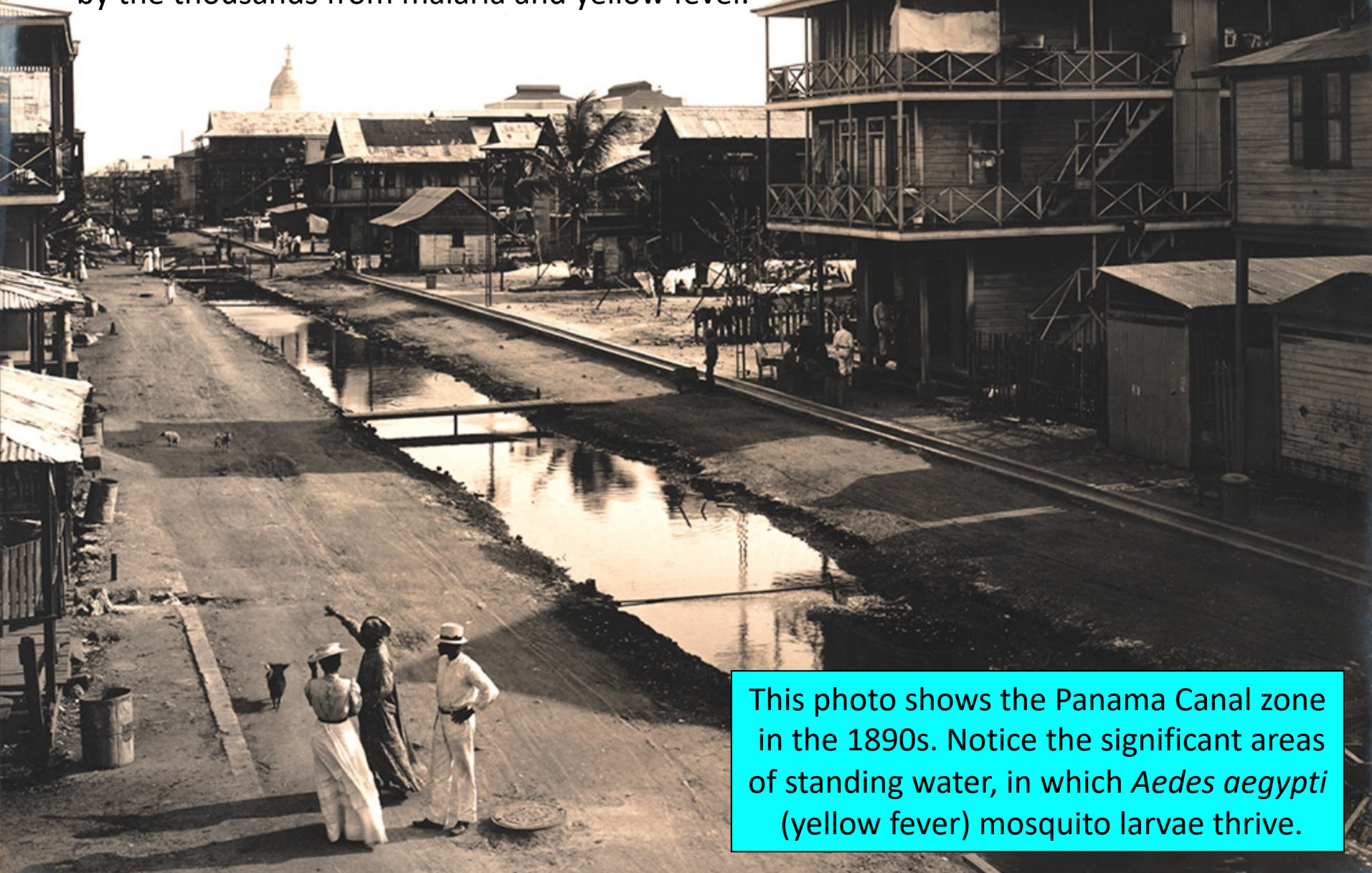
There can be no science – indeed, no knowledge generally speaking – ***with*** consensus, ***if finding new knowledge requires breaking with the consensus*** – yet one must follow the consensus or risk social exclusion.

**The history of science
is a long chronicle of
consensus-breaking.**

**Three examples – from the
hundreds possible – follow.**

In the 1880s, why did the French fail to build the Panama Canal?

For many reasons – but mostly because they died by the thousands from malaria and yellow fever.



This photo shows the Panama Canal zone in the 1890s. Notice the significant areas of standing water, in which *Aedes aegypti* (yellow fever) mosquito larvae thrive.

A biological, medical and epidemiological question: *what was the transmission vector for the yellow fever disease agent?*

...when Reed presented the mosquito theory to a Public Health Association meeting...in November 1900 he was greeted by a stony silence, followed by scathing criticism. The *Washington Post* was condemning in its report of the new theory: “Of all the silly and nonsensical rigmarole about yellow fever that has yet found its way into print – and there has been enough of it to load a fleet – **the silliest beyond compare is to be found in the mosquito hypothesis.**”

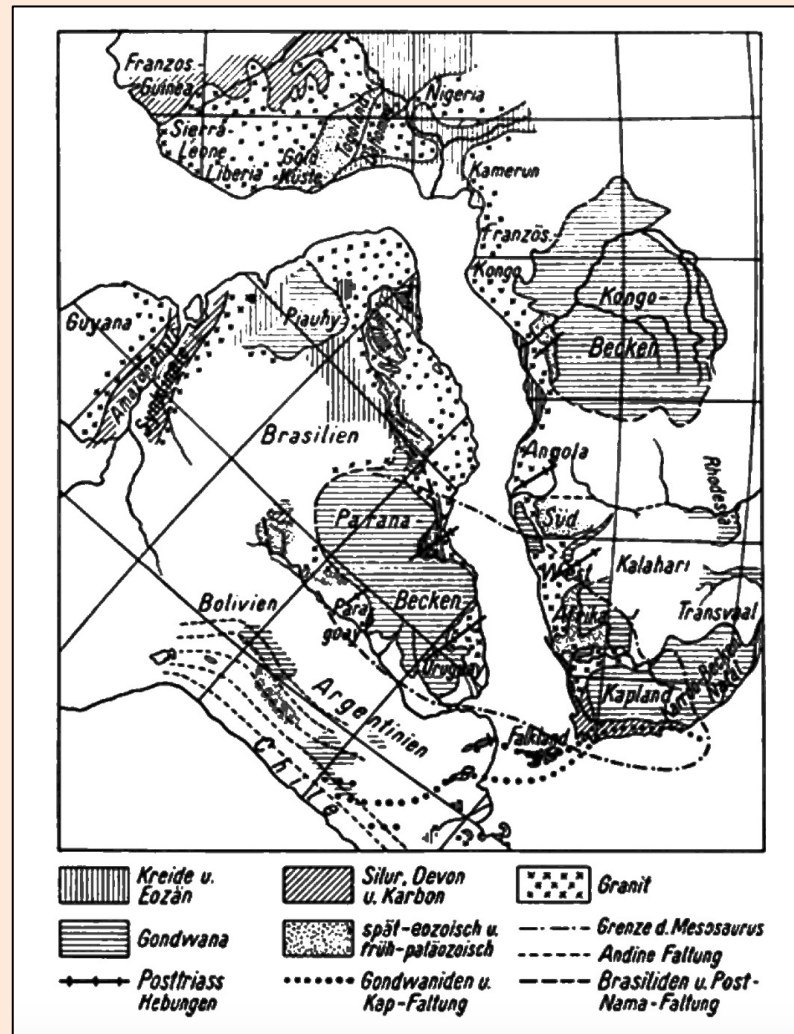
Matthew Parker, *Panama Fever* (2009, 289; emphasis added)

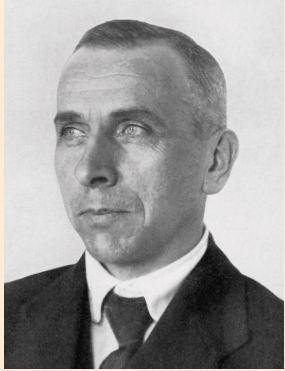


Alfred Wegener (1880-1930)

Theory of continental drift (1912, 1929)

An illustration (in German) from Wegener's 1915 book, *Die Entstehung der Kontinente und Ozeane* (The Origin of Continents and Oceans), in which he proposed his poorly-received theory of continental motion. The figure shows stratigraphic continuity between South America and Africa, across the Atlantic Ocean.





Alfred Wegener (1880-1930)

Theory of continental drift (1912, 1929)



George Gaylord
Simpson
(1902-1984)
American
Museum of
Natural
History

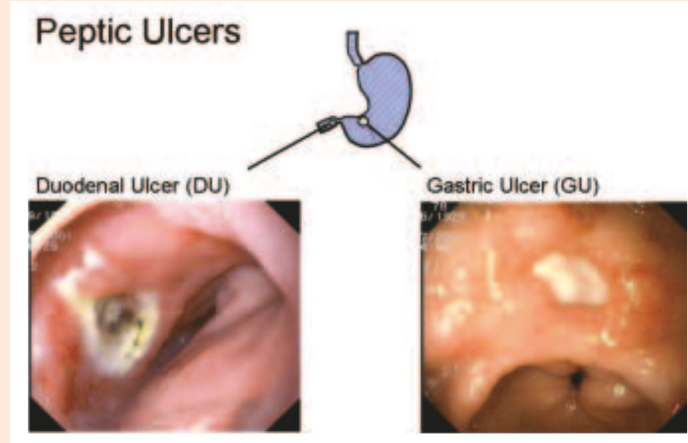
“The fact that **almost all paleontologists say** that paleontological data oppose the various theories of continental drift **should, perhaps, obviate further discussion** of this point and would do so were it not that the adherents of these theories all agree that paleontological data do support them. **It must be almost unique in scientific history for a group of students admittedly without special competence in a given field thus to reject the all but unanimous verdict of those who do have such competence.**”

G.G. Simpson, “Mammals and the Nature of Continents,” *American Journal of Science* 243 (1943):1-31.

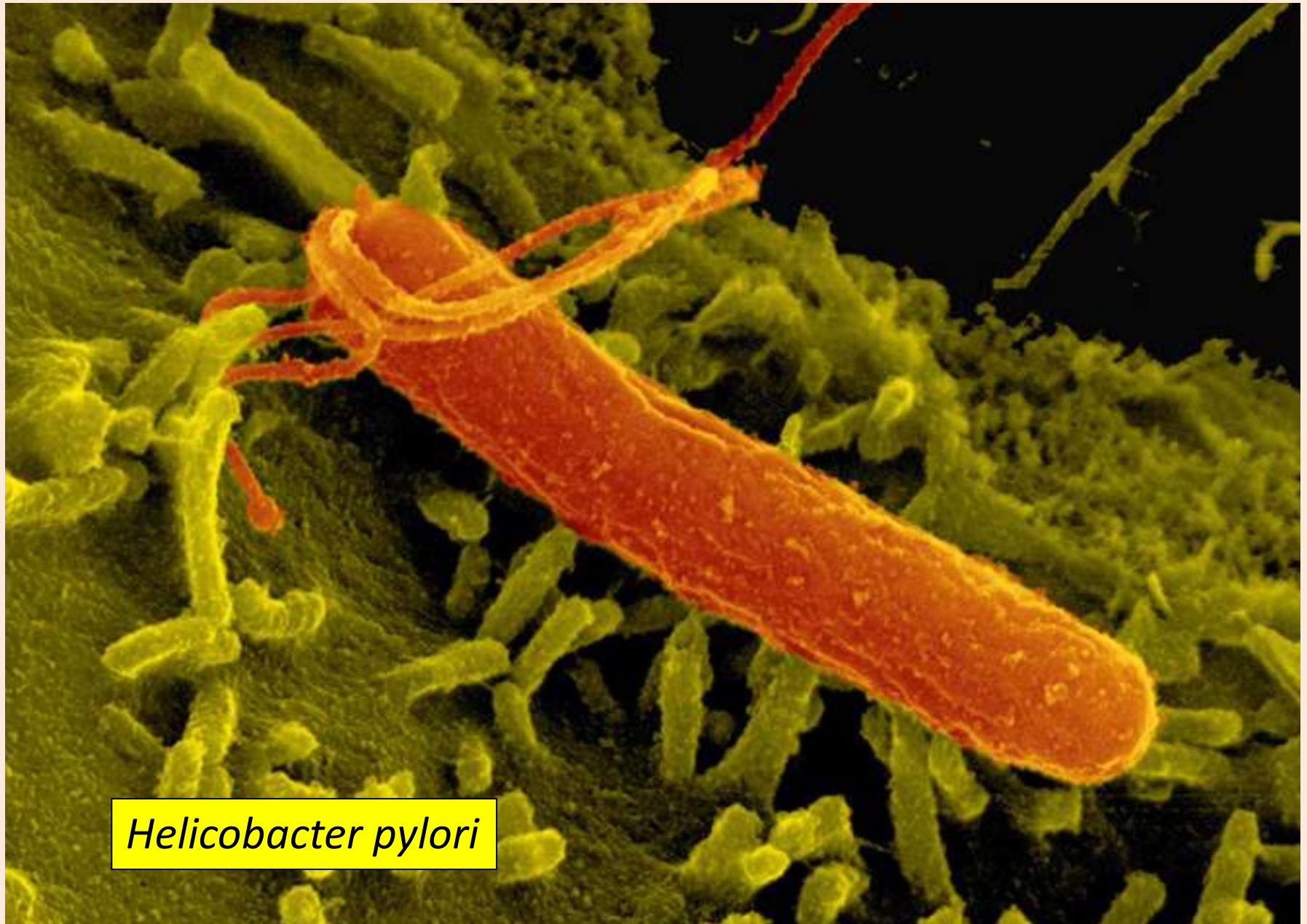


Barry Marshall, MD

“But we already know...”



“...in 1982 the cause of peptic ulcers was ‘already known’. Ulcers were caused by excessive amounts of acid secondary to personality, stress, smoking, or an inherited tendency.”

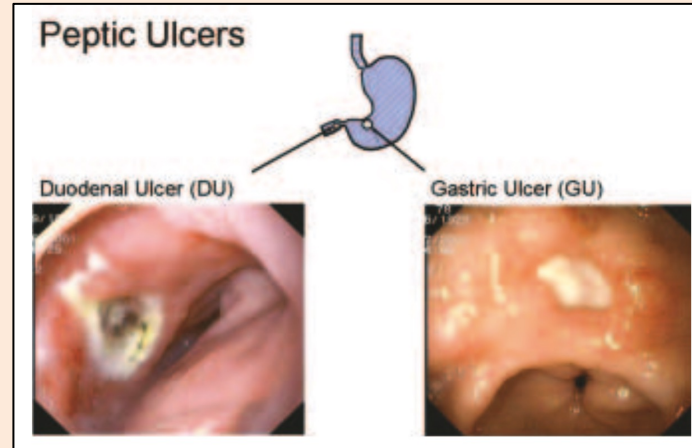


Helicobacter pylori



Barry Marshall, MD

“But we already know...”



“Thus, when *Helicobacter* was revealed, doctors were not looking for a new cause of peptic ulcers, *that territory had already been taken by the illusion of knowledge.*”



Barry Marshall, MD

“But we already know...”

“I realized then that the medical understanding of ulcer disease was akin to a religion. ***No amount of logical reasoning could budge what people knew in their hearts to be true.*** Ulcers were caused by stress, bad diet, smoking, alcohol and susceptible genes. ***A bacterial cause was preposterous.***”

The promoter of the regulative role of consensus now raises his hand:

“Your citation from Barry Marshall on the last slide, Paul, yields up the game. *Marshall won the Nobel Prize in Medicine in 2005.* So how obstructive could the scientific consensus really have been?”

“For that matter, Walter Reed soon triumphed over his epidemiology opponents, and was honored by having his name given to a major federal hospital.”

“And, only 25 years after Simpson’s condemnation, continental motion via plate tectonics became the new orthodoxy in historical geology.”

Answer: Reed, Marshall, and the proponents of plate tectonics won their place in our knowledge, not *because* of the consensus, but *despite* it.

Reed *et al.* had good evidence.

1. **Learn** and understand the consensus (deeply).
2. **Watch** for evidence contradicting the consensus.
3. **Defy** the consensus, which may be personally costly.

Okay, that's the philosophical pep talk I usually give to students. But now – the inevitable complications.

When the unruly kitten of reality...



...discovers the neatly rolled yarn of philosophical theory.

**A troubling thought
experiment about
consensus – “the herd
effect” – from the late
Cornell physicist
Thomas Gold (1920-2004)**

**Or how being perfectly moderate
and reasonable can create
near-uniformity of opinion, in the
total absence of new evidence
or solutions to unsolved problems.**



“New ideas in science,” *Journal of Scientific Exploration* 3 (1989):103-112.

Thomas Gold (Physics, Cornell University)

Imagine answering the question, “**How likely is it that currently dominant theory Y will continue to govern the research conducted in scientific field Z?**”

Give your answer as a number between 0
(that is, the pending total failure of **Y**) and 10
(i.e., the confirmation of **Y** by all new data; indefinitely into the future, theory Y continues to gain strength).



“New ideas in science,” *Journal of Scientific Exploration* 3 (1989):103-112.

“Each round of decision making has the consequence of essentially taking the initial curve and multiplying it by itself. **Now we understand the mathematical consequence of taking a shallow curve and multiplying it by itself a large number of times.** What happens? In the mathematical limit **it becomes a delta function at the value of the initial peak.**”

(emphasis added)

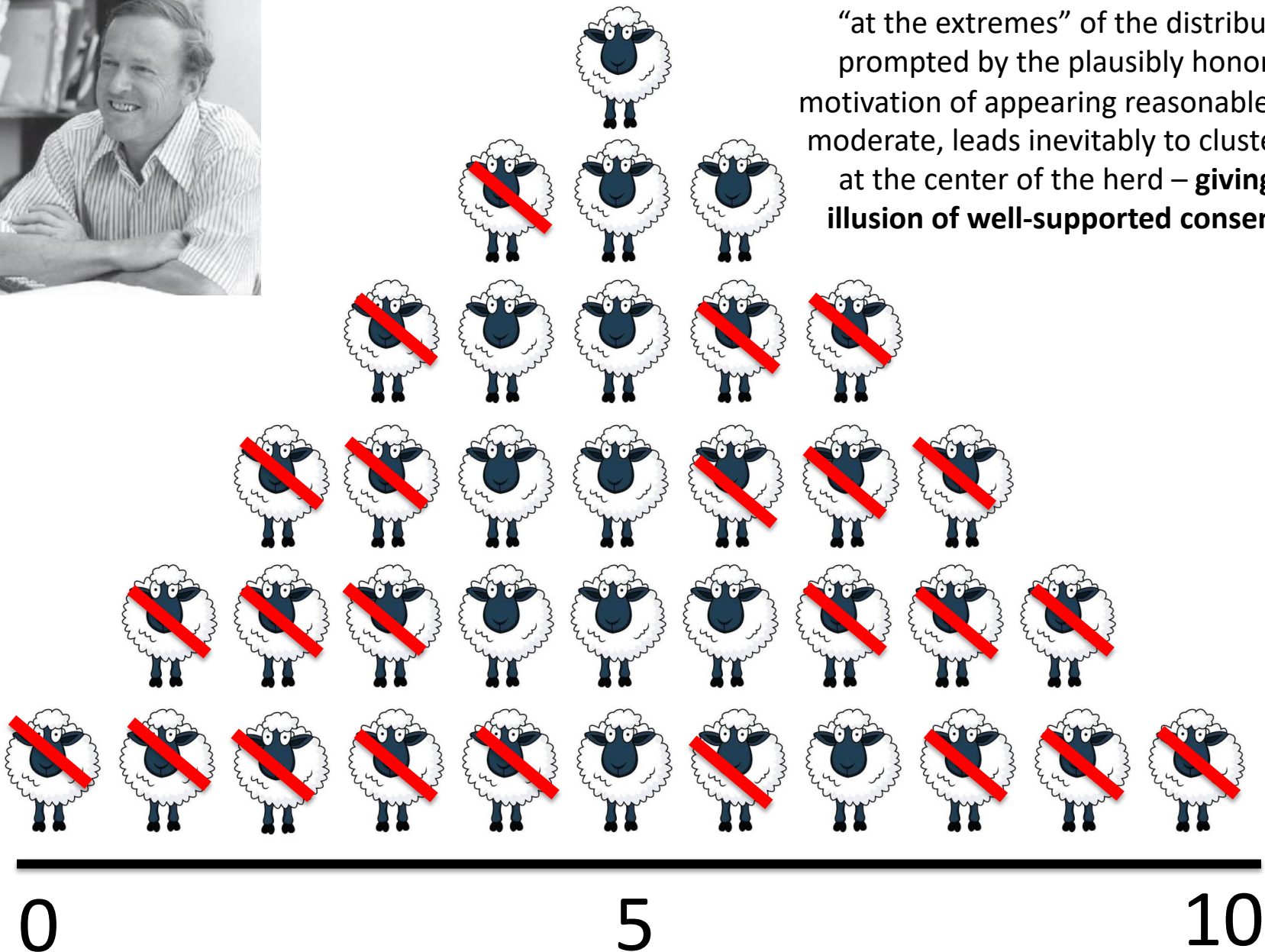


“New ideas in science,” *Journal of Scientific Exploration* 3 (1989):103-112.

“If you go for long enough, you will have created the appearance of unanimity. It will look as if you have solved the problem because all agree, and of course you have got absolutely nothing.”



The gradual extinction of opinion
“at the extremes” of the distribution,
prompted by the plausibly honorable
motivation of appearing reasonable and
moderate, leads inevitably to clustering
at the center of the herd – **giving the
illusion of well-supported consensus.**



Oh, come on – *just show us the evidence!*



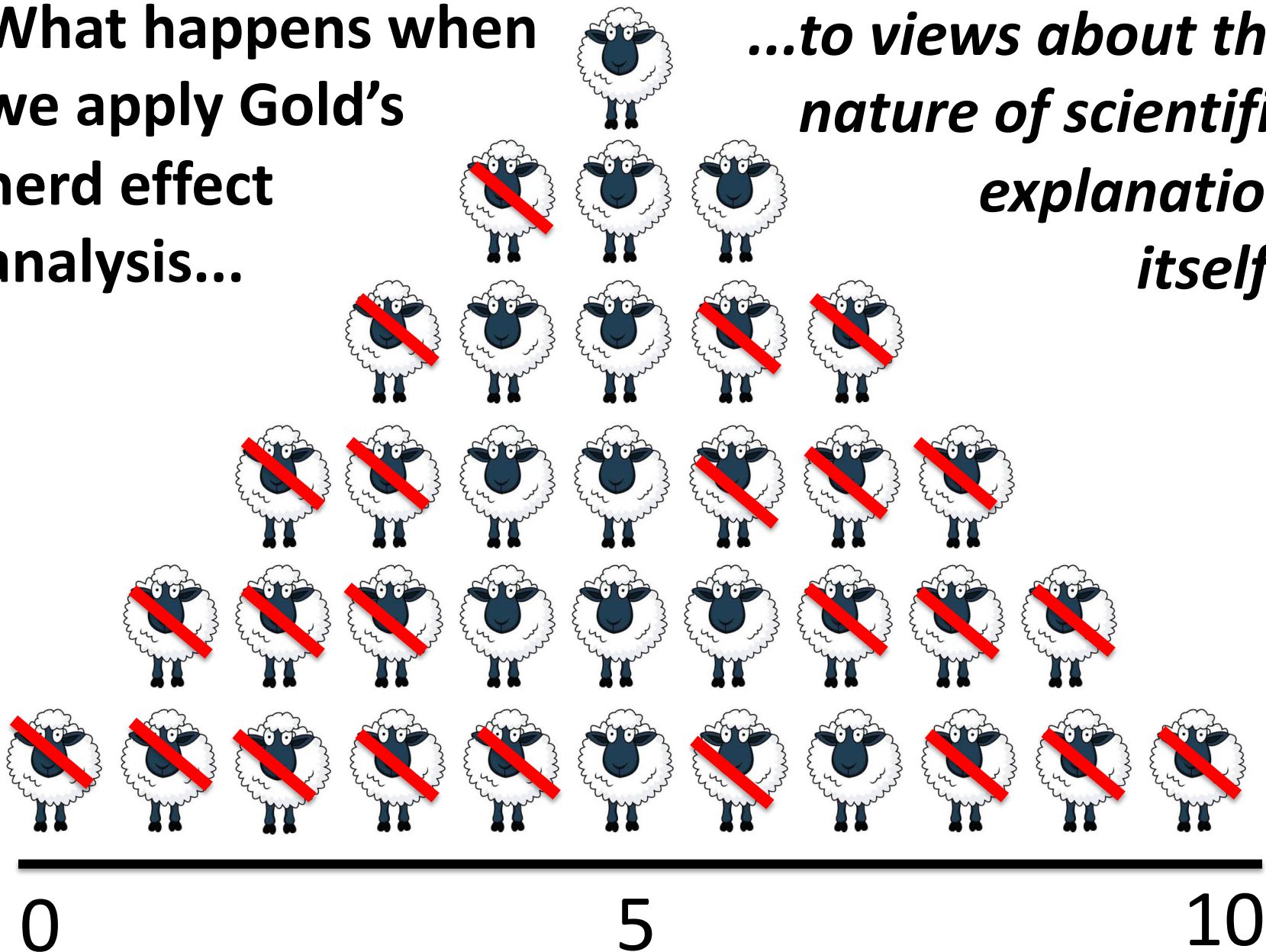
Sounds about right – right?

Alas, if only life were so simple. Evidence is NOT enough when the very definition of “evidence” is in play.

One person’s ***evidence*** may be another person’s ***unsolved research problem***. Consider abiogenesis, or the unknown mechanisms of animal macroevolution.

What happens when we apply Gold's herd effect analysis...

***...to views about the
nature of scientific
explanation
itself?***



Additional resources:

Jarred Allen *et al.*, “A Castro Consensus: Understanding the Role of Dependence in Opinion Formation,” Proceedings of the 2020 Truth and Trust Online (TTO 2020), pages 12–20, Virtual, October 16-17, 2020.

Available at <https://www.cs.hmc.edu/~montanez/pdfs/allen-2020-castro-consensus.pdf>

Patricia Rich, “Hidden Costs of Epistemic Conformity: Lessons from Information Cascade Simulations,” *British Journal for the Philosophy of Science*, forthcoming.

Available at <https://www.journals.uchicago.edu/doi/10.1086/717292>