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Why Science Can't Break the GMO Stalemate

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The debate on genetically modified organisms has become stuck, with participants entrenched in two opposing and immovable camps. By its title, Mark Lynas's new book, *Seeds of Science: Why We Got It So Wrong on GMOs*, hints that it might offer some fresh insight as to how or why we got stuck in this impasse, and perhaps also how we might find a way out.

Alas, this hope is dashed. While purporting to provide a clear-eyed, science-based perspective on the topic, Lynas instead rehashes familiar arguments from the last two decades of debate. His rambling narrative is peppered with a selective history of key scientific breakthroughs, some soul-searching about the nature of technology, an affirmation of the value of the natural environment, and ultimately a plea for Greenpeace and other anti-GMO activists to stop spreading "post-truth."

Since a key selling point for Lynas is that he is a convert—a former GMO opponent who saw the light—the book remains useful as a case study. What has gone wrong with the debate such that even someone who has occupied both sides has no new insight into why the two continue to talk past each other?

The central problem that plagues Lynas's argument is the same one that plagues the GMO debate in general: The conceit that the battle will be won by establishing a unitary scientific Truth about whether genetically modified organisms are good or bad. This view from nowhere is impossible to achieve for an issue bound up with so many questions of social and

Seeds of Science: Why We Got It So Wrong on GMOs
By Mark Lynas

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cultural meaning, from humanity's relation to nature, to the significance of life, to the role of markets in creating, shaping, and producing it.

What ought to be genetically engineered, when, and to what ends—these are questions far broader than biologists can answer. Lynas's book reveals how damaging the effort to pretend otherwise has been.

The Road to Scientific Redemption

Mark Lynas, a British journalist, became a controversial figure in the GMO debate in 2013 when, in a lecture at the Oxford Farming Conference, he performed a public repentance from his past life as a dedicated green activist opposed to genetic engineering. His awakening was widely covered in the media as evidence that "honest consideration of the science will change minds about agricultural biotechnology," as Cathleen Enright, then of the Council for Biotechnology Information, put it to *Forbes*. Accordingly, five years later, Lynas's book-length intervention employs his now signature dramatic flourish: a first-person account of his prior life of sin as a hardcore, crop-slashing GMO opponent, followed by his journey of redemption, which has brought him to the righteous path as a biotech promoter.

Lynas's conversion was prompted by the public response to a 2008 *Guardian* piece that he had "written off the cuff and published without references," in which he raised some concerns about genetically modified (GM) crops uncontrollably infesting other crops. Reader comments—which Lynas evidently takes deeply to heart—were mostly negative and accused him of "fearmongering," "cheap mysticism," "rank superstition," and, of course, ignoring the science. In trying to disprove his critics, Lynas discovered the glories of evidence and the credibility to be gained by accompanying one's work with long lists of citations.

Calling this period of awakening his "own personal Enlightenment," Lynas emphasizes the gap between the worlds of activism and science, broadly characterizing activists as heedless of evidence. With his conversion as backdrop, Lynas offers a selection of popular anti-GMO claims and their scientific rejoinders. This rebuttal session allows him to dramatize his personal realization that scientific consensus—coming from preeminent institutions such as the American Association for the Advancement of Science and the British Royal Society—has declared GM foods to be safe for human consumption.

Lynas's effort to demonstrate the whole litany of ways in which anti-GMO activists are wrong, while also claiming that his arguments arise

simply from science, leads him down a path that, however well-meaning, is perilous. He graces his readers with "A True History of Monsanto"—a defense of a major producer of GMO-related agricultural products, often cast by opponents as a main villain. In illustrating how entwined science is with the corporations capitalizing on its fruits, he inadvertently undermines his conceit that the issue is simply a matter of science, separate from economics, culture, and history.

Villains and Victims

The focus then shifts to the developing world, and the controversy over the role of genetically modified cotton in the high numbers of suicides among farmers in India. Monsanto's GM cotton was approved in India in 2002. Since then, activists, journalists, filmmakers, and some scientists have been arguing that the higher cost of GM cotton compared to conventional varieties has led to greater debt among Indian farmers, which, when crops fail—as they often do—leads to higher suicide rates. The role of GM cotton in farmer suicides has been denied by Monsanto and others, who typically point to social and technical problems, such as lack of credit and irrigation systems, as chiefly responsible for the misery wrought by crop failures. India, they argue, has a long history of farmer suicides, which has not been affected by the introduction of GM cotton.

As one would expect, the issue is immensely complicated, with a wide array of potential political, geographic, economic, and cultural factors. For instance, a 2015 paper in *Environmental Sciences Europe* concluded that the use of genetically modified seeds is likely to be profitable in irrigated fields. However, the majority of cotton grown in India is watered exclusively with rain, a production method that is more vulnerable to crop failures. In these cases, using the more expensive GM seeds may present a greater risk for farmers. Similarly, the authors of the 2017 book *A Frayed History: The Journey of Cotton in India* refrain from making a simple claim about whether genetically modified cotton is or is not responsible for suicides, arguing instead that introducing GM cotton "exacerbated a fragile situation."

But in the fight over whether GMOs are good or bad, both sides routinely ignore this complexity, as if determining the cause of farmer suicides in India will settle which side is telling the truth about genetic engineering itself. Unfortunately, Lynas does not make an effort to step out of this simplistic divide, concluding that "the Indian farmer suicide story is a myth built on tragic individual anecdotes and extrapolated to a

whole country by those… with an ideological axe to grind and little concern about the true facts."

In this gross oversimplification, Lynas rejects what he calls anecdotal evidence—instead offering his own from his travels to India and Bangladesh. From these accounts, he argues that anti-GMO forces are trying to deprive farmers of the ability to feed themselves and their families. He depicts restrictive biotechnology regulations in these countries as having been created on the basis of anti-science propaganda, perpetrated on the naïve local regulators by well-funded, malevolently anti-GMO campaigners from Europe and the United States. He then visits Africa, where he depicts the heartbreak of starving farmers in Tanzania and Zambia who, but for unreasonable regulations, could be enjoying pest-resistant cassava and enhanced food security for their families.

In each of these first-person accounts, anti-GMO campaigners play the role of demons lurking just around the corner, never the subject of the author's interviews or of sympathetic character development. They spread lies and spend their days "driving in posh cars, and calling conferences," as a representative of the Uganda National Farmers Federation puts it. Lynas is unsurprised that GMO opponents would misrepresent farmers' experiences with genetically modified crops, explaining, "I suspect they already knew what they wanted to find and so didn't take the trouble to check the facts."

This is a typical characterization of activists for Lynas—they are always cynically painting a picture of a world they suppose exists, without bothering to find out what's really in it. In contrast to our narrator's heroic embrace of the truth, these activists are tragically blinded by ideology. Thus, "the anti-GMO groups are the villains and the farmers are the victims because they have been denied the right to choose better seeds that might help them emerge from poverty."

The goal is to flip the anti-GMO worldview on its head: Obviously *someone* is The Villain and someone is The Hero. With this approach, Lynas intensifies the polarization and the simplistic framing of the larger debate. To accept their facts is to be swayed by corrupt interests and ideologies; to deny our facts is to be post-truth.

The Public's Risk to Itself

Lynas next examines the history of the anti-GMO movement, arguing that the first to raise concerns were not the activists but the scientists themselves, in the early 1970s. Among them, for instance, was James D.

Watson, co-discoverer of DNA's double-helix structure, who worried that lab-created organisms with new combinations of genes might become a threat to existing plants and animals, and maybe even to humans.

Existing biotech regulations, Lynas argues, are aimed not so much at preventing harm as allaying public fear. But this strategy has wound up turning against well-meaning biotechnologists and policymakers. He cites an image of scientists wearing full-body "moon suits" to spray strawberry crops with genetically engineered bacteria, which generated alarm when published. "Precautionary regulations aimed at reassuring an anxious public," he concludes, "can have exactly the opposite effect."

The public, who is understood as the ultimate beneficiary of biotechnological goods, thus becomes the primary risk to the ability of scientists to deliver these goods: "Now plant science using genetic engineering had a new and potentially highly expensive risk attached to it, the risk of public rejection." This is what Lynas depicts as the central threat we must counter.

Having played the firebrand, midway through the book Lynas now attempts an odd, unearned shift in tone and argumentative style, taking the stance of majestically removed observer: "Both sides have resorted to underhand tactics and have demonised their opponents in propaganda. Sooner or later there will have to be peace negotiations and an Armistice." Lynas has spent the book up to this point demonizing his opponents; it seems we once again get to watch Lynas recognize and confess his sins.

Meeting the Critics

In the following chapter, "What Anti-GMO Activists Got Right," Lynas turns again to the personal and interpersonal struggles brought about by his conversion, especially friends who became adversaries. For the first time in the book, Lynas finally takes the time to meaningfully engage with a wide range of ideas from beyond the technocratic realm. The need to do so was apparently a late realization. He writes that after he had sent an early draft of the book to his publisher, he realized, "I wasn't really doing much service to the cause of truth—my analysis was shallow, many of my targets were straw men, and if I were advancing any cause at all it would be one of polarisation rather than illumination."

So he sent the draft to some of his old environmentalist friends, including writers George Monbiot and Paul Kingsnorth and Greenpeace anti-GMO activist Jim Thomas, asking for comment and discussion. His friends present him with an understanding of science that is not simply

a conglomeration of value-free facts. Instead, science in their view is a human and social enterprise, one with fields of inquiry that stretch back far before the present debate, and now shape which questions show up as worth asking of new technologies.

Technology, by the same token, must be evaluated along with social and political implications much broader than health and safety considerations. Monbiot, for example, agrees that there is scientific consensus on the safety of GMOs, but is concerned instead with how corporate power can harm the powerless. As Lynas puts it, "If knowledge is power, by the nature of our unequal society some people will be more empowered by knowledge and its resulting technological applications than others."

Lynas is intrigued, does some research, and finds evidence to support Monbiot's point: In Paraguay, less than two percent of landowners own eighty percent of farmland, most of which is used to plant Roundup Ready soybeans, a Monsanto-engineered crop. The genetic modification technology favors large-scale production, contributing to the loss of land by small farmers and to overall social inequality. Knowing that there must be many more examples like this, Lynas is "happy to concede" that the political implications of GMOs matter, and even acknowledges, "this was all a far cry from the simplistic anti-Monsanto activism I had imagined most anti-GMO campaigners were still engaged in."

But Lynas is ultimately able to dismiss these concerns. Tech critics willing to renounce certain technologies, he argues, are often inconsistent in their shunning—Wendell Berry proudly refuses to use anything but pencil and paper to write, but his wife types up his manuscripts on a typewriter. But the deeper problem with this species of tech criticism, Lynas says, is that it presumes we can know in advance how a new technology is going to play out in the long term. Technology critics are often wrong in their predictions, overconfident in their pessimism.

Lynas's brief foray into matters of complexity and politics concludes with an anecdote from his conversation with Jim Thomas, who proposes, "What if we could drag emerging technologies into a modern court of public deliberation and democratic oversight? What might that look like?" Lynas answers, "It might look something like the worldwide campaign of opposition to genetic engineering—a new technology which many people also saw as harmful, and not always without good cause." Despite acknowledging their occasional good reasons, in the next chapter Lynas moves on to a psychoanalysis of environmentalists that demonstrates how little he actually learned from the reunion with his old friends.

"A Sense of Moral Transgression"

In the chapter "How Environmentalists Think," Lynas develops his claim that the environmental movement systematically rejects rationality and evidence. He relies on the work of social psychologist Jonathan Haidt, who argues that human beings are much more committed to maintaining loyalty to a group than we are to the pursuit of truth. This, according to Lynas, is how environmentalists operate, and why they are unable to accept the facts about genetic engineering, to which he is privy by virtue of his honorary membership in the science club. Scientists, he argues, simply do not fall prey to such foibles of human nature—at least in the aggregate, when they release authoritative statements of a broad consensus.

He also finally offers a distinction between moral and scientific arguments. The question of what the limits to genetic engineering should be is a moral one, he says, and should be debated as such: "It is not fine to twist scientific evidence so that it can be used as a rationalist fig leaf to obscure an implicit moral case."

But morality and ethics, as Lynas treats them, are ultimately just subjective feelings, devoid of rational content. GMOs trigger "a sense of moral transgression," and the arguments people make against them, even about power and corporate control, are just rationalizations. Even Lynas's own commitment to science, he acknowledges, is ultimately reducible to feeling: "Although I defend the right of anyone to have a fundamental moral objection to genetic engineering, I find Kenya's ban objectionable because it offends my equally strong commitment to empiricism."

So what is one to do about this state of affairs, all these brute impulses rudely bumping into one another in the busy public square? "None of this," Lynas insists, "is intended to suggest that people with moral intuitions are somehow irrational or silly," or that we should insist on discussing only the science. "We ignore or displace people's sense of morality at our peril in what are construed as only scientific debates." Rather, Lynas's call is for honesty in debate. Instead of voicing moral concerns in scientific language, distorting science in the process, GMO opponents should be upfront, offering objections like, "'You can't put a bacterial gene in this maize because I believe that to do so is wrong.'"

The trouble is this: By reducing non-technocratic ways of seeing the world to mere gut reactions masked in rational language, Lynas delegitimizes them, while implicitly elevating the vision of a good world—namely, a technological one—widely shared within particular cultures of scientific reason. For when social and cultural objections to GMOs are denied

rational content, there is no longer any *reason* to heed them, beyond that it is a terribly nice and inclusive thing for scientists to allow if they feel like it. Yet few of Lynas's new friends seem moved to such magnanimity.

Why Can't We All Just Get Along?

What Lynas fails to account for in his efforts to sort the scientific from the moral, and his insistence that they must be dealt with separately, is the role of existing political and scientific institutions in shaping the GMO debate. One reason it is so frustrating to both sides is that a "court of public deliberation and democratic oversight" for emerging technologies does not really exist.

In the United States, political mechanisms for having open discussions about emerging biotechnologies are limited. Because the biotech industry is a major economic sector, and new biotechnologies often come with promises of job creation and economic growth, elected officials are generally unlikely to want to restrict or outright oppose them, although Democrats position themselves as on the whole more favorable toward regulation.

The designated channels for contesting the desirability of particular biotechnologies are regulatory agencies—the Food and Drug Administration, the Department of Agriculture, and the Environmental Protection Agency. While these agencies solicit public comment on proposed regulations, the scope of comments deemed relevant to crafting regulations is narrow, and the vast majority of what the public submits is usually thrown out. If an organization such as Greenpeace wishes to make an argument about whether a particular technology is socially undesirable or morally problematic, it will likely be ignored.

Lynas is not wrong that GMO opponents often offer scientific arguments when their real concerns may be something else. Could this have something to do with how our political institutions structure such debate, and not just with environmentalists' irrational psychology? If the only legitimate register in which to criticize a new technology is that of risk, it should not be terribly surprising when this is how opponents articulate their concerns.

Take for example the AquAdvantage salmon, the first genetically engineered animal approved for human consumption. Before the FDA granted approval in 2015, the agency had solicited public comments to its initial assessment that production of genetically modified salmon would have no significant impact on the environment. It received about 38,000

comments, of which it dismissed all but about 90 for not specifically targeting the substance of its analysis.

The following year, a collection of environmental groups filed a lawsuit. It argued, among other things, that the approval ignored "intertwined socioeconomic harms related to the production, commercialization, and proliferation" of the genetically modified fish, specifically the "impacts to salmon fisheries and the social and economic well-being of those who depend on them." Congress's involvement has also been narrow: The issue targeted by proposed legislation has been whether to label the product as genetically modified to inform consumers. Mired in regulatory uncertainty for years, the GM salmon has not yet been produced or sold in the United States. (This will likely change in the near future: In March, as this article was going to press, the FDA announced the removal of the import alert that had prevented the salmon from being produced in the U.S.)

In the AquAdvantage case, as in so many others, the lack of a public forum that permits deliberation on the full meaning of such a provocative technology feeds our frustration. Some concerns are systematically delegitimized, and the groups representing them feel ignored; others feel they are surrounded by Luddites who abuse science to advance their emotional mysticism. No one is served by the resulting confusion.

Lynas concludes with a let's-hold-hands call for inclusion:

> So let's hear it for the GMO proponents. But let's also hear it for the vegans, the conservationists, the farmers, the scientists, the environmentalists and indeed everyone who is working to understand how we can best protect this planet both for future human generations and for the rest of life around us. Let's use science as the wonderful tool that it is, but let's also respect people's feelings and moral intuitions about the proper extent of human intrusion into the biosphere.

Yet the last chapter finds him doubling down, outraged that Greenpeace will not reverse its position on the potential health risks of GMOs. Despite his sojourns back to his native environmentalist land, and his new encompassing view, he is unable to let go of his conviction that if we can all just get the facts of the matter right, everything else will fall into place. Lynas ultimately has no way to see the controversy he so wishes to settle except in terms of scientific believers and deniers. A call to let all voices be heard means little when all must speak in the scientist's tongue.