Of old habits and new ideas

Poliomyelitis or polio is a disease that causes irreversible paralysis and even death. Unfortunately, it mainly affects children under the age of five. This debilitating disease must be banished and it is indeed on its way out. According to the World Health Organization, polio cases have decreased by over 99% since 1988, from an estimated 350,000 cases in more than 125 endemic countries. This is mainly thanks to the “Global Polio Eradication Initiative” (GPEI) that rolled out a large-scale polio vaccination programme in the late 1980s. One might be excused, then, for assuming that the invention and administration of the Polio vaccine, which made the GPEI possible, is a good thing that must surely be globally applauded. Well, not quite. Innovations such as the polio vaccine are often not embraced by everyone. It should therefore come as no surprise that certain parts of the world, the polio vaccination is still dogged by controversy even today.

There are various reasons why a section of the population will vocally, and sometimes even militantly, oppose any innovation. Some of these reasons are explored by author Calestous Juma in *Innovation and Its Enemies: Why People Resist New Technologies*. When it comes to innovation, the book explains that neither the genuineness nor the gravity of a problem being addressed is enough to make the innovation universally acceptable. For example, the author talks of “transgenic farming” or genetically modified crops. If you think the burgeoning world population requires food security and that engineering the genetic make-up of crops to increase yield is a universally acceptable solution, then dream on. Environmentalists, green campaigners and self-styled “friends of the Earth” believe that it is in the best interests of our planet to protect it from any such farming and its proponents, who are often deemed as “foes of the Earth”.

Juma argues that some of the controversies that follow innovations could be directly traced to the very change brought about by the innovation itself. He echoes Austrian-American economist Joseph Schumpeter’s concept of “creative destruction”, which suggests that “the change that comes with innovation requires the destruction of something old and replacing it with something new”. This very process brews tension between the proponents of incumbency and the people promoting innovative ideas. The palpable tension is further fuelled by the “fear of loss”, or better still, “perceived loss” that is associated with change. Loss here could be anything from economic loss, to loss of the Earth’s biodiversity and even one’s cultural heritage.

In the book, Juma addresses the controversy that follows each of nine flagship innovations. With enough attention to fine historical details, the book promises not to bore the reader, especially combined with Juma’s lively and engaging style. Each chapter starts with a detailed historical background to the chosen innovation, followed by a lucid description of its specifics, before delving into the controversies surrounding the innovation and the reasons behind the tension. Starting with the ancient but lively story of the innovations relating to coffee and its consumption, through to controversy-laden transgenic farming, Juma tries to communicate to the reader the justifications and evidence that are often used by antagonists in suppressing a particular innovation. Some of the reasons why a certain group will vehemently oppose a breakthrough, and the methods used to stop it, are quite obvious, but readers should be prepared to be surprised or in the very least, amused.

Take the battle of electric currents, for example. The book chronicles how the proponents of Thomas Edison’s direct current (DC) vilified the alternating current (AC) championed by George Westinghouse in the 1890s. Edison and his supporters publicly demonized AC as cruel and unsafe. To substantiate their claim, they sent 300 volts AC through the spinal cord and brain of animals to electrocute them. This inadvertent act of horror would later pave the way for the use of the electric chair as a form of capital punishment in the US. Edison actually realized the superiority of AC and his primary intention was not to stop its adoption, but rather to delay it so he could recover/divest his investment from DC.
As the blog’s title suggests, condensed-matter physics and nanoscale physics. Why should high energy and astro folks have all the fun?” – that essentially describes why Natelson began blogging in mid-2005. Indeed, in his first post, he describes hunting around the Internet for atomic, molecular and optical physics blogs, only to come up empty-handed. Since then, Natelson’s blog has been regularly updated, at a rate of four to five posts a month, and examines a myriad of topics. 

What are some of the topics covered? 
As the blog’s title suggests, condensed-matter physics blogs are a regular feature: from quantum computing to metasurfaces. These are often in-depth, but Natelson keeps the contents and his language as simple as possible, making all his writing enjoyable. He often covers a topic in a series of posts over a week or two, so no individual post is onerously long. He also regularly follows up on previous research news and topics, even a few years on, providing a swiftly developing field with the necessary context. Apart from research, Natelson also writes a variety of posts on everything from conference and workshop reports, collections of short and interesting news briefs and job postings. He often writes about academic life – be it career advice or academic publishing or even occasionally funding and policy news. Interestingly, Natelson also reports on general big physics news – for example, the discovery of a terrestrial exoplanet around habitable zone around Sun’s nearest neighbour – that does not lie strictly in the AMO field, but is of definite interest to anyone in physics.

Who is it aimed at? 
The vast variety of topics covered means that the blog’s readership is wide. While a healthy interest in condensed-matter physics would benefit regular readers, it is not at all a prerequisite. In fact, the blog would be a good place for anyone looking for a solid introduction to the field (especially thanks to Natelson’s wide archive of topics, which he links to in most posts), as well as for those who wish to keep up to date with developments within it.

Can you give me a sample quote? 
From a February 2016 post introducing “density functional theory”: “Let me try an analogy. You’re trying to arrange the seating for a big banquet, and there are a bunch of constraints: Alice wants very much to be close to the kitchen. Bob also wants to be close to the kitchen. However, Alice and Bob both want to be as far from all other people as possible. Chairs can’t be on top of each other, but you still need to accommodate the full guest list. In the end you are going to care about the answers to certain questions: How hard would it be to push two chairs closer to each other? If one person left, how much would all the other chairs need to be rearranged to keep everyone maximally comfortable? You could imagine solving this problem by brute force – write down all the constraints and try satisfying them one person at a time, though every person you add might mean rearranging all the previously seated people. You could also imagine solving this by some trial-and-error method, where you guess an initial arrangement, and make adjustments to check and see if you’ve improved how well you satisfy everyone. However, it doesn’t look like there’s any clear, immediate strategy for figuring this out and answering the relevant questions.”