Intellectual Property, Patents and the Pandemic

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> Edward Murrow: Who owns the patent on this vaccine?
>
> Jonas Salk: The people, I would say. There is no patent. I mean, could you patent the sun?[1]

The news in April 1955 that Jonas Salk, a scientist at the University of Pittsburgh, had developed a working polio vaccine must surely count as one of the most uplifting and momentous announcements of the twentieth century. For years, the virus *poliomyelitus* (shortened to polio) had wrought a devastating toll on adults and especially children. Survivors were often left with severe life-altering disabilities. In the 1940s, the United States was in the grip of a polio epidemic which left tens of thousands dead or disabled every year. Transmissibility was at its height in the summer and parents often feared letting their children out to play. Quarantines were frequent in towns where outbreaks occurred. As David Oshinsky (a biographer of Salk) points out:

> "When we look back upon polio today, you look back upon what was really a summer plague. It came every year. It came like locusts. There was no prevention. There was no cure. There was no protection."[2]

Jonas Salk was appointed professor of virology at the University of Pittsburgh's School of Medicine in 1947 and quickly established a research group with the aim of classifying the different types of polio virus and ultimately developing a vaccine to resist it. Salk went against the conventional wisdom that only a live virus vaccine could be used to treat a viral infection, instead concentrating efforts on creating a vaccine based on a killed virus. By 1955, following Herculean efforts by Salk and his research colleagues, and years of testing (including on Salk's own children), it was clear that the vaccine worked. The world rejoiced and Salk became an international celebrity. Significantly, Salk sought no financial or material gain from his achievement, refusing to seek any patent. Indeed, his response to the question posed by the journalist Edward Murrow as to who retained ownership of the vaccine, "The people, I would say," epitomises the noblest aspects of the scientific endeavour.

The latest World Health Organisation figures suggest that almost six million people have died from COVID-19 over the last two years.[3] Many millions more face the uncertain prospect of living with "long Covid" and its myriad, often debilitating symptoms. It is impossible to fathom the scale of suffering that the current pandemic has inflicted. And like any crisis, it has brought out some of the best of humanity. Frontline workers in a multitude of fields such as health, retail, distribution, transport and education made extraordinary efforts, often at great personal risk, to keep society afloat. And the might of twenty-first century science and technology were deployed to create an effective vaccine in a under year. This is something that few, even at the dawn of the pandemic, thought possible. As with Salk's polio vaccine, this was a monumental achievement.

However, it is hard to imagine a starker contrast than that between the views of Salk, who sought a "people's vaccine," and those of Pfizer chief executive Albert Bourla. Pfizer saw its revenues double to $81.3 billion last year.[4] Almost half of that ($37bn) came from sales of its COVID-19 vaccine, making this vaccine one of the most lucrative products in human history. Between them, the main vaccine players Pfizer and Moderna have obtained an essential monopoly (or duopoly) under the protection of intellectual property legislation. Sales and supply of the vaccine have prioritised wealthier nations, leaving whole swathes of the developing world with little access. Last year, the EU reportedly paid about $30 billion over the cost price for its share of Pfizer and Moderna vaccines.[5] Though the small number of vaccines that have been made available to poorer nations are sold more cheaply, the price is still many times the cost of production. For example, in July of last year the Pfizer-BioNTech vaccine was sold to African nations at $6.75 per unit, then its lowest recorded price. This was still about six times more than the estimated production price.[6] Jim Clarken of Oxfam Ireland commented:

> "Despite a rapid rise in Covid cases and deaths across the developing world, Pfizer/BioNTech and Moderna have sold over 90 percent of their vaccines so far to rich countries, charging up to 24 times the potential cost of production."[7]

Aside from the human suffering this permits, it is utterly absurd when fighting a virus, which mutates over time, to leave reservoirs of unvaccinated people in which the virus can thrive. This leaves the whole world vulnerable to new variants. If ever there was an event that required a combined international approach, based on cooperation and human need and a foregoing of profiteering, it is the COVID-19 pandemic. And yet, the profiteering has proceeded with gusto.

The Pfizer vaccine (like its Moderna equivalent) is based on a radical new approach, making use of so-called messenger-RNA technology. Roughly speaking, it involves providing our cells not with a weakened or even killed version of the virus but with what is no more than a "piece of code" for creating a part of the virus: the so-called spike protein. Our cells are then instructed by this code to produce copies of the spike protein (without any other part of the virus!) and so our immune systems are "trained" to target this protein. This safely prepares our immune system to recognise and destroy the actual virus should infection occur. Perfecting this technique involved overcoming significant challenges, given the inherent instability of a tiny strand of RNA code. As we will discuss, this technology is based on decades of research and is of enormous potential benefit in developing all sorts of new treatments, possibly even a vaccine for HIV.[8]

Given the magnitude of the crisis and the potential applications of mRNA technology, there have been repeated calls by scientists, governments and health and development agencies to suspend international property rights and make the vaccine recipe available. This would allow for the generic production of vaccines, tests and treatments and enormously improve access in the poorest parts of the world. Indeed, in November of last year, even the US administration (usually a stalwart defender of corporate pharmaceutical interests) showed support for a partial waiver on intellectual property rights with respect to COVID-19 vaccines given the discovery of the Omicron variant.[9] Despite this, Pfizer and Modern have held firm, refusing to share life-saving technology and reaping staggering rewards. Pfizer CEO Bourla describes international property rights as the "lifeblood of the private pharmaceutical sector."[10]

Before returning to Bourla's position and the claims of the pharmaceutical industry and their defenders, it is worth considering a recent report by Oxfam.[11] Over the course of 2022, COVID-19 has taken the lives of about seven thousand people a day in Africa, where approximately 90 per cent of the population is still unvaccinated. And while public pressure has mounted in support of an intellectual property waiver (to the extent that recently French leader Emmanuel Macron even promised support for such a waiver), the European Union position is still firmly on the side of Big Pharma. In particular, the Irish government has been one of the major blockers within the World Trade Organisation of the proposal made for such a waiver by India and South Africa and backed by over one hundred nations. Despite the lofty promises made at the start of the pandemic, the EU has badly neglected the Global South. Projects such as COVAX, aimed at vaccinating the developing world, have run of out of funding having failed to reach their modest targets. Shockingly, EU nations will have to dump about fifty-five million unused Covid vaccinations by the end of February. In contrast, they have provided the continent of Africa with a mere thirty million.

To most of us, the accumulation of staggeringly high private profits at the expense of unutilised productive capabilities amid the enormity of death and suffering dealt by Covid represents a crime against humanity. Yet those who challenge it are accused of not understanding how research takes place, of not appreciating the enormous effort and risk taken by the industry in developing new medicines, or of undermining innovation. Indeed, when WHO director-general Dr Tedros Adhanom Ghebreyesus pointed out that Pfizer had neglected the Global South to pursue more profitable vaccine deals with richer countries, he was accused by CEO Bourla of "speaking emotionally."[12]

The big pharmaceutical firms have tremendous lobbying power and considerable influence on legislation. Indeed, this has allowed them and other firms to secure the sort of intellectual property regime we live under today. They have also, for many years, honed and refined their public relations response to moral outrage. The standard argument they make, repeated by much of the political, media and intellectual establishment throughout the developed world, is that without the sort of monopoly privileges that international property rights guarantee (and the profits they facilitate) there would be no incentive to make the substantial investments in time and money necessary to develop new drugs. Thus, the profits made by Pfizer et al are a necessary part of the development process. Interfering with this, they claim, threatens new medicine.[13]

There is an immediate objection to be made to this argument. The development of COVID-19 vaccines was overwhelmingly funded by states, not the private pharmaceutical companies.[14] Vaccines are developed by scientists and most of the scientific research which led to the COVID-19 vaccines happened at

publicly funded institutions. For example, despite Boris Johnson's claim that we have "greed" to thank for the Astra-Zeneca vaccine, the reality is very different. This vaccine, which was developed at Oxford University, received funding mostly from UK government departments and the European Commission, as well from some British and American scientific institutes. Less than 2 per cent of the funding came from private industry.[15] Moderna received about ten billion US dollars from the US government, covering almost the entire cost of clinical development.[16] While Pfizer claims it never received direct development support from the US government (its partner firm BioNTech did receive $445 million from the German state),[17] it benefitted massively from advance purchasing orders valued at $6 billion. All firms had their risks attenuated by the lifting of regulatory restrictions and government investment in supply chain infrastructure.

Even this, however, is just the tip of the state-sponsored iceberg. In developing their vaccines, private pharmaceutical companies were able to draw upon the deep reservoir of fundamental research knowledge obtained at universities and government-funded institutes. The Pfizer and Moderna vaccines rely heavily on two substantial scientific discoveries: the viral protein developed by Dr Barney Graham and his team at the US National Institute of Health, and the concept of RNA modification developed by Weissman and Karikó at the University of Pennsylvania.[18] Indeed, Moderna's founders named the company as an abbreviation of "modified RNA." The research leading to these discoveries goes back many decades and was entirely federally funded. Without this, the vaccines would not exist.

Virtually all fundamental scientific research is funded by the public. The strategy for the major pharmaceutical firms (as with capital more generally) has always been to wait until research reaches a point of applicability (and potential profitability) before taking an interest. Their role, and the investments they make, usually involves the latter stages of clinical trials, comparisons with existing drugs and marketing. In recent decades the situation has changed somewhat. As public institutions became increasingly starved of state funding (a state of affairs which is heavily related to large-scale tax avoidance by the corporate sector), state institutions were increasingly forced into dubious partnerships with private companies. In the United States, the passage of the Bayh-Dole Act in 1980 was a watershed moment. It meant that patents obtained for federally funded research were no longer the property of government but could be transferred to commercial partners.[19] This has had a highly damaging effect on fundamental research, discouraging open discussion for fear of violating intellectual property rights. Moreover, the growing role of corporate preferences in funding decisions means an increased priority for research with likely short-term applications, to the detriment of deeper, less tractable problems. This is painfully ironic given the role fundamental research played in tackling Covid.

The intellectual property rights which underpin the ability of companies like Pfizer to wield monopoly power are part of a complicated set of rules known as the TRIPS agreement. This is the Agreement on Trade-Related Aspects of International Property Rights. It was formulated and drafted principally by private corporations and negotiated (often in secret) over several years during the eighth multinational trade negotiations of the General Agreement on Trades and Tariffs (GATT), the so-called Uruguay round, and effectively came into law in 1995. It is now administered by the World Trade Organisation (WTO), and all member states are expected to comply. The agreement itself is exceptionally detailed and represents the most comprehensive intellectual property legislation ever devised. It covers all manner of copyright, patent and trademark issues from industrial designs to plant varieties to academic textbooks to music and film. The extent to which entities can be patented, what counts as a novel invention, is now frighteningly broad. And while the US Supreme Court did rule in 2013 against the patenting of genes discovered in nature,[20] it is perfectly possible to patent genes that have been modified in a laboratory. Moreover, given the lobbying power at play here, the battle over such ownership of biology is far from over.

The real point of TRIPS, as Professor Peter Drahos (an expert on intellectual property and global business regulation and author of the book *Information Feudalism*) points out, was to set a global standard for intellectual property rules, one which suited the major capitalist firms in the wealthier countries, and to link intellectual property legislation with trade.[21] This would give US and EU firms significant "enforcement powers." Countries could now be brought to heel with threats of serious economic consequences if they did not comply with the requirements of Western companies. In his book, Drahos describes the skullduggery that occurred during the TRIPS negotiations: the threats of trade wars made against Brazil and India, the false promises of agricultural aid to African nations (and amid the ravages of an AIDS pandemic) to gain the votes needed to make TRIPS a reality.[22]

As a result of TRIPS, powerful multinationals were in a much better position to crush competition and extend their power.

Traditionally, countries could adapt their own patent rules to suit their interests. Throughout the 1960s and 1970s, for example, India's generic drug manufacturing industry became highly adept at reverse-engineering and thus mass-producing a whole host of important medicines. It was an ambition to prevent this and gain control over such markets that motivated the development of TRIPS.[23] While India's generic drug manufacturers managed to adapt and are still very active today, in Africa the passage of TRIPS dealt generic drug manufacturing a blow which is has not recovered from. It is important to realise that the lack of a generic drug infrastructure means that the patent holders retain a de facto monopoly even after the patents expire. Thus, drug prices stay high.

All of these consequences apply more generally. A company like Monsanto is now far better placed to enforce patents it had obtained on new varieties of seeds. The effect of this is to place farmers in the developing world permanently on the hook to Monsanto, depriving them of the lion's share of the profits from the sale of their crops.[24] Publishers of university textbooks or scientific papers can charge colossal prices for access to information. Importantly, the original authors usually receive little to nothing or, perversely, end up paying copyright cartels for the privilege of being published![25] The effects of this in the developed world are bad enough. Ask any student about the cost of textbooks or any researcher or university librarian about the cost of access to academic journals. In the third world, this has a catastrophic effect on scientific and technological development. It also gives the lie to any claims that modern intellectual property legislation is there to encourage innovation.

One of the key motivations in all this is to guarantee that the largest share of profit goes, not specifically to the manufacturer, but to the patent holder. So, for example, a company like Apple can outsource the physical manufacture of its iPhones to factories in China, but by virtue of its intellectual property and the laws which enforce this, they still reap most of the reward. This has an added advantage when it comes to avoiding taxation. Unlike a factory or a physical product, intellectual property is eminently mobile, and its value is notoriously difficult for tax assessors to establish. Incidentally, Ireland's role in assisting this form of tax avoidance is infamous.[26]

At the heart of the corporate defence of legislation like TRIPS is an ideology which views knowledge as a commodity whose production is motivated only by financial gain. Of course, researchers (and anyone involved in creative processes) must adapt to the realities of capitalism. This often means applying for patents and intellectual property protections if only to acquire the funding to do the research. And there may be some for whom the dream of making millions from an invention is their primary motivation. Incidentally, as corporate power grows and intensifies, the ability of the garage inventor to make his or her fortune becomes more and more illusory. In the main, though, this is not why people do research. Indeed, if one was to suggest to the typical laboratory scientist that their career choice was motivated by money, one would be laughed out of the room. Most working scientists at institutes and universities are not particularly well remunerated for the work and deal with ever more insecure and precarious working conditions. [27]

Throughout history, people have asked questions about and investigated the world based on nothing more than curiosity or the need to solve a problem: wondering about our place in the universe or trying to cure an illness. In this deeply human process, progress and innovation have benefitted immensely from cooperation and the sharing of ideas. The idea that Einstein should have tried to patent his theory of relativity or that the Darwin estate should have control over which scientists make use of concepts from the theory of evolution by natural selection would strike anyone as absurd. Consider for example, the importance to European development of the diffusion of mathematical knowledge from the Arab world in the fourteenth, fifteenth and sixteenth centuries. Without such knowledge it is difficult to see how the Renaissance could have occurred. Imagine the effect if modern intellectual property rights were enforced on the algorithms of arithmetic! And yet modern algorithms (which incorporate these more fundamental ones) are patented all the time, thus imposing a license fee on the user.

All of us owe an enormous debt to the countless generations who, through their curiosity, toil and inspiration, amassed a mountain of knowledge about the natural world. We stand not only on the shoulders of giants but on the massed ranks of millions of labourers, farmers, craft workers, potters, minders, artisans and "low mechanics." This knowledge is the common treasury of humankind. It is highly interconnected and every new scientific idea today, irrespective of the brilliance of the scientists involved, relies on it. The idea that private firms have a right to ignore this debt, to own scientific knowledge and profit from monopoly privileges arising from the intellectual property legislation they formulated, while millions suffer, is a moral outrage.

In reality of course, claims of moral justification by those who defend these intellectual property rights are hollow and disingenuous. This is about power. And a growing number of people recognise this. Whether through open-source software and publishing[28] or through the production of patent-free drugs (such as the Corbevax Covid vaccine [29]), many scientists resist the commodification and corporatisation of their discipline. This is science at its best, echoing the spirit of Salk. Capitalism corrupts and distorts that spirit, privatising knowledge which should be in the public domain, sacrificing the well-being of millions to feed the profits of the few, and worse, prioritising research that suits the needs only of those who can afford to pay for its fruits at the expense of the needs of the many. Private industry does not pay for scientific research. It profits from it. It is only under capitalism, whereby the world is turned upside down, that we are expected to feel we owe a debt to companies like Pfizer or to think that if they did not feed their shareholders, scientists would not be able to do science. Those of us who care about the pursuit of knowledge for the betterment of humanity must continue to resist and challenge these falsehoods as we strive to build a world with different priorities.

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