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# Open Source, DIY Medicine with Four Thieves Vinegar

Mixael Laufer & The Final Straw Radio

12 March 2023

**TFSR:** Would you please introduce yourself for the audience with any name, preferred pronouns, location, affiliation, or any other info that could help the audience out?

**Mixael Laufer:** My name is Mixael Laufer. Doctor is my proper honorific, although none of my friends use that. I currently live in Southeast Asia and I go by any and all pronouns.

**TFSR:** Cool. So would you talk a bit about the Four Thieves Vinegar Collective, where the name comes from, how you all started and what unifies you as a project?

**ML:** Yeah, we're an anarchist collective and the stated goal is to try to get medicines and medical technologies to people who need them, but don't have access for whatever reason. The reasons typically that people don't have access are either price, legality, or lack of infrastructure. Putting in systems of being able to do DIY for medicines and medical technologies tend to bypass all of those particular problems in a pretty profound way. So, most of our efforts are centered around trying to disseminate information on how people can, without the support of institutions or infrastruc-

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ture or seeking legal routes necessary for acquiring the medicines and medical technologies they need. They can make them themselves and it's easier, cheaper, oftentimes more effective, and the accessibility goes up.

The etymology of the name comes from a story out of the plague times of old, not our most recent plague times, but the bubonic plague times. There was a thief or band of thieves that was going into areas of where plague was breaking out and were performing robberies, which was typically ill advised, people avoided plague ridden regions like the proverbial plague. So there were a lot of questions as to who the person or persons was/were and how they were managing to do this, and why they were unafraid of being infected. Eventually, they were caught, and it was a band of four brothers. When they were pulled in front of the magistrate, the magistrate said, "All right, well, we're going to hang you all. Or alternatively, you can tell us how you've not been falling victim to the plague despite being exposed and we will spare you."

Clinging to life as they did, they gave up their secret, which was merely that they were utilizing a decoction of certain antimicrobial herbs that their mother had taught them to prepare. The dissemination of that information throughout that community resulted in a lot of people not falling victim to the plague, because they utilized that and it was termed four thieves vinegar. You see this crop up in a lot of places have sort of mythology as well, surrounding the almost paranormal reverence with which microbes were treated at the time. Some of the mythology surrounding the undead are there. So the four thieves vinegar is a preparation that theoretically could also... it grew up to have this mythos about it, that it also would repel vampires or whatever else.

Currently there are a lot of herbalists who will claim that they have the fourth use vinegar recipe. Due to my research, it doesn't seem like there is a specific surviving recipe that is genuine in any way. But it's pretty easy to surmise that any number of things that

get their hands on these tools and be able to use them. And sort of have a medical technology sort of Tupperware party. “Here, everybody come in and we’ll work together and you can see how to do this and then you can take this away with you, and you can show everybody you know how to do it.”

So, if any of your listeners have places where they’d like to host an event, please let us know. Because we’re interested. I don’t know what your coverages but not just the US. We’re going to be in Europe, and Canada, as well. And, again, anywhere else anybody really wants to host us, we’re game to travel. We have a lot of people who know how to do the things we do that are happy to meet with people in any corner of the world where you’d like to put medicine back in the hands of the people who need it.

are recognized currently as being antimicrobial and coming from plant sources are probably some of the ingredients.

So that story felt like a piece of spiritual ancestor-ship were the dissemination of quality medical information resulted in a lot of people being a lot healthier, just because people were able to do something themselves because they knew what to do and so that was where we join in.

**TFSR:** So, listening to that background, it almost kind of feels like y’all represent less the thieves who are using this technology that’s come from the communal background of their mother’s herbal history that she’s learned from generations of people that they’re applying in order to hide from other people during the middle of a pandemic, so that they can rob them. Which is a very privatize method of approaching medical technology, it seems almost like y’all represent the magistrate in this story. A sort of people’s justice that allows for the commoning of that knowledge of how to evade the microbes.

**ML:** That’s a lovely observation. I’d hate for us to be equated with any sort of authority figure. I kind of think of it in a somewhat inverted sense that the feeding that we do is of the information and giving it back to the people in sort of an inverted setting of taking it away from the authority figures and disseminating it. Even though in the case of this particular story, the magistrate did do something good. It’s hard to think of magistrates with any compassion, or associate them with anything good. But, yes, functionally, sure, it is the distribution of the information and trying to help the people. That is the function. Though we do it by means of often intellectual property theft. It has maybe two layers to it.

**TFSR:** Could you introduce us a bit to open source medicine and explain a bit for the radio audience what the concept of biohacking is? You’ve said something in past interviews along the lines that you all are not necessarily inventors, you’re not the people that are doing the research that creates the chemical compounds, tests on subjects and stuff like that. But more you’re

innovating by making that stuff available to wider audiences of people.

**ML:** Yeah, that's fairly accurate. The process of developing medical technologies is quite sprawling. It's difficult to do. Medicine as a whole is extremely sprawling. You have everything from someone in a lab trying to deal with molecules and macromolecules and trying to see what is possible in the manipulation of microbiology and or biochemistry all the way to the question of is there infrastructure in place so that somebody who is not literate or not literate in the local language understands how to utilize the infrastructure that exists in order to help them in order to get access. If any one of these fragile links breaks, things don't work too well.

The research side of developing medications is difficult. That's not an easy thing to do. What we look for primarily, is to hijack things that are on the shelf. That was sort of the genesis of Four Thieves, is being enraged by the existence of medical technologies that sit on the shelf unused. There are a lot of places where delivery can break down, but one of the things that I often say is that it really says a lot about the state of humanity when we spend so much time, so much energy, so many resources, developing all of these really quite remarkable medical technologies in many cases and then refuse to deliver them for whatever reason.

So, the function of Four Thieves, for the most part, is looking around for things that are lying fallow on the shelf, or are for other reasons inaccessible and saying, "How do we bridge the access?" We have been praised in the past for innovations in delivering those mechanisms, but that's not not medical research. So it's important to differentiate where the line is in terms of developing things. Usually what we're looking to do is saying, "Here's something that works very, very well under certain conditions but nobody has it. Why not? And how do we fix that?" So, maybe you could say a little more in terms of your question?

**TFSR:** I guess while people may be familiar with the term *hacking*, colloquially meaning to take something that is ostensibly for a

people who are a little more level headed than I am in the organization.

These notions of security that people from the hacking world have been working on and thinking about for so long, because we've worried about what could potentially eventually happen. Very sadly, they're happening now. So all of this preparation that's been done over the years is now really relevant and needed, so that people can keep themselves safe. We work hard to keep everybody as safe as possible in the digital realm.

**TFSR:** And there's a PGP key up there too, in case folks really want to do encrypted emailing.

**ML:** Yeah, if you want to get in touch and you have some special privilege information, maybe you're an insider in the pharmaceutical world and you know that somebody's holding on to some technology that could be useful, then go ahead and encrypt us something if it feels necessary. That said, make sure you know how to use PGP. We have gotten a couple of PGP messages in the past that have been... There have been a number of problems. Sometimes they've been clear text, sometimes they've been just encrypted improperly and so it's just been garbage that we couldn't decrypt. So take the time to do it carefully if you really feel that's necessary. At the same time, most of the time it's not necessary. If you have some really good information, you don't have to give it to a straight away, you can just say, "Hey, I'd like to get in touch. I have something interesting." We'll probably want to chat.

**TFSR:** Well, Mixael, thank you so much for having this chat and I look forward to sharing it with the audience.

**ML:** Sure. The last thing that I'll say is that in addition to the videos that we're disseminating, over the summer we usually do a lecture tour in the United States trying to hit big conferences. We'll probably be a DefCon this year, because we always are, we're shying away from most of the big conferences. What we're looking to do more is do small workshops in little anarchist spaces or info shops or squats or collectives or wherever people actually want to

to work for a living but if one's undertaking like ours is to try and allow people to do things to manage their own health, they should be left alone to do so and not be charged a fee for it.

**TFSR:** Well, in terms of the question of legality and accessing the information, I note that you have taken some steps to try to keep people who are going to be visiting your site a little safer. I know that there are a lot of fears about tracking who visits what websites or using information from menstrual trackers on people's phones, possibly to prosecute people and building a case that someone has illegally committed abortion in a state where that's illegal.

Can you talk a little bit about some of the things that you've done with the Warrant Canary with the Tor site?

**ML:** We sort of did all the classic things that you're supposed to do in order to try and protect people who might be utilizing your site. Risk profiles are different for everybody. Right? When you're thinking about how to stay safe on the internet, you have to do this threat modeling process which is really boring but really necessary. We have to decide who's really likely to try to come after you and what capabilities do they have? For some people who are just curious we have a plain sight on the regular ol internet you can come see it and no big deal. We don't log visits or keep track of anything. We also have a hidden service on Tor. So you can either visit our plain site through Tor or you can visit the hidden service if you want to be a little extra careful. This also means that if somehow, somebody came after our regular site, they could never shut down the hidden service.

There's a warrant Canary there, too, so that if, for some reason, we got some sort of injunction or summons or something, and we're told on top of that, that we had a gag order and weren't supposed to talk about it, that would expire, and people wouldn't know that something was up. I mean, that said, just personally, I probably would violate it and yell about it anyway. But it's an extra level of protection, if that were deemed not the best course of action by

certain purpose, and use it for another purpose, modify it somehow and make it do things that maybe it wasn't 'developed' to do. Biohacking, this is a term that a lot of people probably won't (outside of a lot of subcultures) be really familiar with, but the idea of using information that's already out there in terms of the open source part, and then allowing people to apply that to their own needs is an interesting approach.

So, I wonder if you could just like expand a little bit more about within the framework of biohacking, do you see what you're doing as fitting within that? I know that you sometimes will be in the biohacking space at the Hackers of Planet Earth (HOPE) Conference. How does opening up approaches towards people being able to mess with their own chemistry or try to rebalance their chemistry? How does that align with the hacker ethic?

**ML:** Sure, I often argue that the practice of hacking is an ethical one, that it is this great good in the ethical sphere. The reason for that is that oftentimes systems, for whatever reason, are presented in such a way that they are only for a certain class of person. The practice of hacking, taking something that is designed for a certain purpose and utilizing it in a more creative way, allows for people to solve that problem of classist, gatekeeping through technical means.

The roots of hacking, of course, go back to the early days of computation and computer science when computers were fairly rare. They were only owned by a couple of very well endowed and heavily administrated institutions, mostly academic. So, if you were interested in computer science, it really wasn't an option. The practice of hacking broke things down in such a way to say, "Look, these things don't fall from the sky. These are built by human beings. Some of these things might be hard to get, but there are ways, and you can build them yourself if you take the time and the care to understand what's going on."

Of course, that term has been unfortunately, co opted and perverted and the practice of hacking in the nomenclature has been

now co opted. Now it's the sort of corporate term that's used for big companies to essentially get free research by calling it user innovation or hacking and getting a bunch of people to work for free. Biohacking similarly, has become this terribly watered down statement where anybody who decides to put olive oil on their coffee or work out calls themselves a biohacker. I mean, I guess that's fine. It's just kind of...

The practice of biohacking in my mind harkens back to the roots of hacking, where you look at the biological technologies that are available now and some of these incredibly innovative things that can be had: Gene therapies, vaccine technologies, incredibly sophisticated small molecule chemistry for drugs... Looking at it and saying, "Well, that exists, but it might cost \$80,000 for a course of treatment." It might be something that you can only get with the blessing of a doctor and a specialized research group that's willing to work with you and your body and to say the same thing, "These technologies do not fall from the sky. They are created by human beings. They're built by human beings, and some of the materials might not be the easiest thing to get but they are acquirable." If you do acquire the same things and you do the same things with the same materials and you get the same result, because that's what science is.

To look at a drug and say, "Well, that drug costs, however much it costs, or that drug is not approved in my country," or "that drug has been a barrier because of legislation," or "my doctor won't give it to me because he's drunk on his own authority and joys being a gatekeeper," or any number of other things that might stand between you and the therapy that you think is best for your body and to say, 'Well, I'll just do it myself.'

There are a lot of ways that this can manifest. The simplest of which is if you find yourself needing a drug and you find out what the active ingredient in that drug is, which, of course, must be labeled. If you have the name of that drug, it's easy enough to find. You can make a deal with a chemical supplier and merely try to get

You don't have a bunch of stuff for sale on your site. Which I think is great.

**ML:** We do not have anything for sale on our site. If you click on our merch page, it's just instructions on how to make your own. Or you can print your own stickers, we have instructions on how you can knit a little Plague Doctor. Doll, we have instructions on how you can cross stitch a patch. We never sell anything, we have never sold anything, and we will never sell anything ever. Not even kits. You want to make it. You can make it yourself. We can link to things, so it's easier to find. But we're not associated with any of the things that we link to. We just want to make it easy for people to make life better.

**TFSR:** I guess that probably protects you in a lot of legal ways also and makes your lives a little easier too. In terms of not having to go post stuff all the time.

**ML:** In theory, it might. Although my lawyers are not impressed. Basically, when you talk about if this affords any legal protection... If they want to arrest you, they will arrest you.

**TFSR:** It's like saying "In Minecraft?"

**ML:** It's like, okay, maybe. If you're doing a theoretical intellectual exercise in terms of where might this fall legally if it were ruled properly, then sure, theoretically, certain freedoms of speech, so to speak, do cover us disseminating this information but a lot of those things don't qualify anymore when you're in the medical space. In the US, just to give an example, in the state of New York, and in a number of other states, if you said, "Hey, Michael, I have a headache" and I said, "Hm, have you thought about taking an aspirin for that?" I'm technically guilty of the felony of practicing medicine without a license, and can be thrown in prison for that.

So, the decision not to sell things is much more one of holding to how important it is to disconnect the notion of trade and the notion of medicine. Medicine should be available to everybody as much as possible and anybody who's trying to trade for that is kind of suspect. That's not to poopoo medical workers who are forced

mouse, no questions asked. That's a pretty long leash to be on. So she and I were collaborating on a project. We were trying to test certain hormones, including testosterone. And I said, "Can you buy this?" We were on the phone and she said, "Oh, sure. Yeah, no problem." I hear her clacking away at her keyboard and she goes, "Uh..."

**TFSR:** It's a controlled substance.

**ML:** But more controlled than fentanyl. This woman can order heroin or amphetamine or cocaine. Lab grade quality shipped to her lab anytime she wants. But testosterone she had a block on. There is an entirely separate license for that. It was merely because of the so-called war on drugs in the '80s and the fact that gym rats who were using testosterone and its analogues as anabolic steroids to build muscle became highly criminalized because it was an easy target. That still hasn't worn off. As a result, trans people suffer.

It would be comical if it weren't so tragic, how absolutely ridiculous and misplaced it is. If it weren't ridiculous to start with. If somebody who wants to abuse their body while they're working out, it's kind of their business. Why would you care? But the fact that 40 years later, it is still on the books and makes it so that people who are trying to adjust the way their endocrine systems function have to suffer because of it, is just absolutely maddening.

**TFSR:** Well, I have kept you on the phone for a very long time and I really appreciate you sharing the space and having this conversation. You've mentioned upcoming that you've got these videos, these explanatory videos talking about some of the tools that you have up on your website. I appreciate the fact that as someone who mails out merch for my project, I looked and expected kind of to see you selling these tools or this whatever. This points to the ethics behind what you're doing. That you're not trying to make a bunch of money off of it. That you maybe have some links to a place on AliBaba where you can buy a specific pump that's useful for this one project that if you're giving instructions to someone about how to how to build something.

that particular chemical on its own. Then you can just put it into a pill and take it yourself. Assuming that's the modus of delivery. You can compound your own drugs. Then there are of course, more ways where you can build hardware, you can do chemistry on your own, you can even in some cases do biochemistry and genetic engineering. Those things are a little different, a little more subtle, depending on which. Again, sometimes the chemistry is complicated, too. But again, these are all finite problems.

The barrier, I believe, is mostly cognitive. When people are so disconnected from the pipeline of the therapies that come to them that it seems like it is something that just came from some magical factory that is only inhabited by robots or magically appeared, you forget that that's not the case. What you're holding in your hand was made by a person and that person is not much different than you. So if you just do what they did, you can make the same thing.

**TFSR:** Can you talk a little bit about your experience with the sciences and how you developed a sense of fluency around things like chemistry and electronics?

**ML:** Sure, classically most of my training is not very applicable. I have sort of a broad education in the sciences. My undergraduate degrees are in mathematics and physics and my PhD is in mathematics. Having played in the sciences, though, my whole life it gives me just enough comfort with these realms that if I decide to dig into it I can read a paper and make sense of it. I can speak with an expert and they can clarify something for me.

The real strength that comes from an education in the sciences, though, really is the fact that you're able to "pop the hood" on one field of study that looks entirely impenetrable and to realize that the rest of them aren't that different in that regard. That you can just take the time to dig in and figure out what's going on and that most of the barrier between you and any specialization (medical, chemical, electronic) is just sort of illusory. There's this sense that, "Oh, this is not for you. This is for special people that have letters after their name, or have studied or fancy institutions." It's really

not, it's just that they're you've been doing it long enough that they're used to it.

Again, another one of the things that is this commonly held misconception is that you shouldn't practice medicine on yourself unless you go and get a medical degree. That's not correct. A Medical Degree is designed so that you can help a wide variety of people with a wide variety of problems. If you're practicing medicine on yourself, you don't need broad based medical education, you need to learn a couple of very specific things about what's ailing you. Anybody, and I say that quite freely, literally anybody can (without great effort) very quickly become better educated about their particular ailment or set of health concerns than your local general practitioner. They're called general practitioners for a reason, they're not specialists.

What you can do is you can become a specialist in your own health. Of course, just as a proviso, I assume that your readers know know this intuitively, but just so that it's very, very clear. When I say "do your own reading," "do your own research," this is not like going around and reading forums or watching videos on the internet. You go and you read the literature and you check to see if you believe what the scientists are writing is actually correct. If they've drawn a bad conclusion or they had a small sample set and so it's inconclusive. Even more than that, there's a great power in doing experimentation on a small scale because you don't need to be bogged down with the details of mechanisms of action or diagnoses.

If you and I, say, decided to sit down and figure out how to deal with something that you or I were sick with, our first line approach wouldn't be, "Okay. Well, what causes the cough reflex in a human? And how do we dig that out on a molecular level?" It's, "What's out there that treats coughs? Do we really need to know which type of thing might be causing that or can we just try a few of them until we find one that works?" There's a great utility and having the ability to take a scattershot approach.

to these things, but also some of these laws that are being passed are going to affect AFAB people that are entering into the later period of their life who would normally be taking HRT to stop hot flashing and such like that.

**ML:** You point out an interesting phenomenon here too, as well, which is that oftentimes things that are barred because of people who are acting out of hate or trying to control other people will have further unintended consequences down the line. Again, if you actually have ulcers and wants to treat them with Misoprostol, it's very hard to get. You mentioned, Mifepristone. Mifepristone is this absolute miracle drug when use for emergency contraception. I didn't know this until fairly recently, but I was reading through one of my pharmacology texts, and it actually states that Mifepristone... If you think about emergency contraception, Plan B, one of those things, typically, it's take this as soon as you possibly can. Within 72 hours if it get into your system it's something like 85% effective. Best of luck. It just pushes your numbers a little bit. With Mifepristone, it's listed as being 100% effective in the first five days after unprotected contact. I've never seen anything in any medical literature that has been 100%. I then looked for some studies and there are some more conservative estimates that are like 99.997%. But thinking about just how much more effective that is than regular emergency contraception, why are we playing around with that when we have this other thing that works so much better? And the reason is only that because it is seen as an abortifacient drug, it is barred. This is RU-486 as it was originally called. It's associated with abortion and so it is specifically controlled in ways that other things are not.

Similarly, harkening back to secondary uses of hormone replacement therapy and ways that those are controlled, testosterone is extremely hard to get your hands on. I was at one point working with a chemist at a top tier university in the United States who did drug-checking. This woman has special licenses from the DEA that allow her to buy lab-grade fentanyl with the click of a



put in another set, and then a few hours later you do the last set. And that should do it.

**TFSR:** Awesome. Cool!

**ML:** This is very exciting, because it's really easy to do. We've shown methodologies previously, that make it so that you can take Miso in other raw forms (it is formulated for horses, because most horses have ulcers) and press it into tablets. You can do that, but pressing things into tablets is slow. It requires a lot of patience. It's it's difficult. Things can crumble or, or cake up, or decap. There are problems with that. Dosing it onto a card with a pipette makes all of these processes much easier. And at the end of the day, you don't have tablets, you just have this card so it's easier to sequester as well.

As for hormone replacement therapy. Yes, we are doing stuff with that. We're being a little quiet about it, because we're trying to develop some new things. But we have been compounding HRT for small groups that we're close with and we're coming up with protocols, again, for people to be able to do this themselves. Because, again, we're not looking to supplant the infrastructural pipeline and just become the purveyors ourselves. The whole idea is to free people from dependence on infrastructure of any sort. Not like, "Oh, I can't find the Four Thieves thing" it should be, "Oh, I made the Four Thieves thing." So similarly to the way that we've been disseminating instructions on how you can make abortion cards rather than just trying to make a bunch and pass them out... Even though we did that. Compounding hormone replacement therapy is something that we're trying to show methodologies that are easy to do at home without special tools or special materials. I will give you a little sneak preview that it can be done and we're very excited to start sharing that with people.

**TFSR:** Yeah, that's amazing. That's great. I had a chance to listen to an as-yet-unreleased, but a recent episode of live like the world is dying, where the hosts were talking about it. Obviously I want my trans friends, comrades, family to be able to have access

It's one of the things that we dig into with Four Thieves is that sometimes there are therapies that don't get approved because they work very well, but only for a small cross section of the population. This is a great crime because if you're one of the 10 or 20% for whom something obscure happens to work, but you can't get it because it wasn't approved... that's wasted technology.

So to circle back to your original question, in terms of my fluency with the sciences, yes, I have a certain fluency with the sciences. The thing that it has lent me is just the fearlessness to be able to sit down and say, "Well, a bunch of other people have figured this out, how hard could it be?" Which I think is the biggest barrier that most people face when they start with the question of, "Okay, I'd like to deal with my health myself. Where do I even start? It feels kind of insurmountable." Training in the sciences teaches you the reflex of what to do when you don't know what to do. You rub your hands together and say, "Okay, well, let's just pick something up and see what's here."

So that's been of great utility to me. Of the missions of Four Thieves, part of what I try to communicate is that nobody is much different than the people who develop these things. Certainly not different than the people who make these things and you can do it the same way that it's done in the factory, or done in the hospital, if you just do the same things. You just need to get over the fear that's been instilled from the authority structure of the medical system saying, "This is only for special people, you will hurt yourself if you step out of line and start experimenting," and to get over that.

**TFSR:** Yeah. And as you say, it's regular people doing things. I want to dig a little bit deeper into the idea of competency. Because, as you've admitted, there's a learning curve. There are probably barriers to access. I don't know that all medical publications are freely available and easily accessible as far as studying.

**TFSR:** Everybody use Sci-hub!

**TFSR:** Can you talk about that a little bit? I've never heard of that before.

**ML:** Oh my goodness! A friend of ours, Alexandra Elbakyan, she was frustrated as many of us are when looking for scientific literature, and finding that most of its paywalled. And paywalled at a rather obscene rate. Typically, if you want to purchase access to a single scientific paper it's about \$30 US, which is absolutely ridiculous especially since most of the scientific literature is publicly funded. To then have it shrouded behind copyright and intellectual property laws, to make it so that knowledge which belongs to humanity, even if the idea of property does not strike you as strange, when you look at something that was developed specifically for the benefit of humanity by public funds that were pooled for the purpose of benefiting humanity, to then have it not be accessible by all of humanity seems really wrong.

So, what she did was she developed a system, the details of which are not public, but what you can do is if you're going through a period of research and you are looking at an academic paper of some sorts and the furthest you get is the title and abstract and it says "if you want access pay us," what can merely do is you go down and copy what's called the DOI. It's an identifying code for academic papers and then you go to Scihub and you paste it in and it just pops out the paper for you and you can download it.

It's an incredibly powerful tool. I use it every day. It's my first or maybe second quick link. I think it's my first quick link. It has to move every so often because it gets shut down. It is undergoing some changes right now, but we're hoping to help with that as well.

But, yeah, access to information is definitely step zero and being able to get your hands dirty and dig around and literature and see what people found out and how much research has been done. When you see something that's really promising, ask yourself the question, "Is this something that only happened in a petri dish? Or is this something that happened in rats once? Or is this something that's been tested a lot of times on people?" You can know all that by digging through the literature, but you have to do the work of

about hormone replacement therapy technologies, and if you all have considered working around that subject?

**ML:** Sure. Yeah. All of that. So that's a big stack. So it's long been known that utilizing Misoprostol alone as an abortion regimen works very accurately. The oft-cited 85% is actually a rather severe underestimate. There was a recent paper that came out that showed that it turns out that low figure comes mostly from people just not taking it correctly and that the efficacy rate is in the high 90's with that alone. That said, it is sort of the gold standard to use it with Mifepristone and we are working on trying to bundle that in the cards as well. We know it's possible. We've done it. We're trying to see if it's an easy thing to do and to pass around. But can other people do it? Yes. Is it easy? Absolutely.

When you purchase Misoprostol, it is sold as a 1% active pharmaceutical ingredient and 99% hydroxypropylmethylcellulose which is a thickener, a binder. The reason it's sold like this is because it makes it stable. Misoprostol is pretty fragile in its raw form. It's an oil, you have to keep it cold and so on. But if you mix it in with this powder, then you just have this loose powder. If you have some of this 1% powder, you can just take 24 grams of it and you put it in with a cup of 190 Proof grain alcohol. You run it in a blender briefly until it becomes this sort of homogenous suspension. You get one of these adjustable pipettes off of amazon for 30 bucks. You turn it to 415 micro-liters. Then you just dip it in, drop the fluid, and you dollop that much on to six dots on a card of your choice. Take that card, let it dry and then seal it in plastic. Then you have an abortion card!

You can do that with 24 grams of the powder and a cup of the ethanol, that is enough to make 100 cards with six dots each. Then when you take it you merely cut the card into six pieces and you take two of these little dots and you put them in between your teeth and your cheeks with the active ingredient towards your cheek, and you'll let dissolve for half an hour. Then a few hours later, you

system being in a hyper excited state, but rather something has pushed your immune system into a hyper excited state and is no longer present and your immune system just hasn't reset, you can just take this and if it works, you can just take it for three – four weeks, and then you can stop and your immune system will be back at its regular set-point.

So, that was really exciting to stumble across. We didn't even stumble across it, there was a researcher who brought it to our attention. We had to go and do the due diligence and check to see if that was actually correct, but it was one of allies who's an academic researcher and he said, "Hey, I found this thing and nobody's giving me funding to to do more research on it, but we think you might be able to get this to people who need it." And we have and it feels really good and we're going to continue to try to disseminate that information.

**TFSR:** I guess stepping back just a little bit when you were talking about the abortion cards, what are the medications on it? Is it Mifo and Miso?

**ML:** The cards are just miso.

**TFSR:** Obviously in the news and affecting everyone living under the US government, there have been a ramping up of pushes largely coming from Christian extremists to impose harsher patriarchy, such as the rolling back of reproductive and sexual education, access to contraception, and de facto legal imposition of forced birthing. Simultaneously and relatedly, increased criminalization, mob threats on gender and sexual expression and autonomy, with a creepy focus on restricting or reversing transitions and access to affirming health care to trans youth, and by extension to all trans people and all people.

So, you've already mentioned the abortifacients in the cards, I wonder if you could say a few words about how those are accessible, and if that's an easily reproducible thing by other folks. Also I wonder, because this kind of falls under the same area under attack that we're living under in this country, if you could talk a little bit

actually digging through the literature first. So access to literature is absolutely key.

**TFSR:** Yeah, you did mention that it's hard these days to not shudder a little when you hear, "Do your research!" [laughs nervously] I've learned tons of stuff off of the internet on forums and videos of how to do engine work or replace a screen on my phone, but it obviously feels like a bit higher of a stake if I'm choosing a different medication than say the person that's been studying it for 10 years tells me the answer. Just to reference, just to be clear, you said, "Just don't just go off of what somebody on one Forum says." Like ivermectin, for instance, is a drug that is used to kill certain worms, right? There's a lot of things that are

**ML:** It's a very effective anti parasitic. It's good against hookworms.

**TFSR:** There's a lot of antibiotics or other medications that are used in a veterinary fashion that can also for a lot of for mammals and as mammals, we have a lot of really common body systems.

**ML:** Oh, I'll say even more than that. When you look at veterinary antibiotics, they're exactly the same. The active ingredients, the same formulations, the same. There's no difference period. If you believe in the sanctity of a factory being meaningful, it's the same pills coming from the same factory. They merely get different packaging, in many cases. That's very effective.

However, since you mentioned antibiotics specifically, that's a great example. Oftentimes, people will get antibiotics that are formulated for fish tanks. Oftentimes, bacterial infections will show up with people who have fish tanks, which I guess makes sense. It's like warm water colony ecosystem. You're gonna have bacteria and so you do sometimes have to dope the water with antibiotics to wipe out bacteria. So the bacteria don't wipe out your fish. So if you get the same active ingredient, say doxycycline, and you can get it formulated for fish... it's not any different. It just comes in a different packaging. You can take it yourself and it's the exact same drug.

The breakdown happens when somebody's taking antibiotics for something that does not call for antibiotics. This is sort of step zero in the "do your own reading." I like to say "do your own reading" instead of "do your own research" specifically to imply that if it's not written down then you can give it about as much credence as, "I heard at a cocktail party." So doing your own reading and understanding that bacteria and viruses are fundamentally different and antibiotics take care of certain types of bacteria and they do nothing against viruses in terms of being able to help your system. Similarly, as you suggest anti-parasitics are good against parasites (certain types of parasites for which they are formulated) but not useful against bacteria and certainly not useful against viruses.

**TFSR:** Yeah. So while the spirit is there, the spirit of innovation and finding alternative ways of treating an ongoing thing... I could go down a whole rabbit hole with that.

**ML:** I think it's really critical, right? Because there's a momentum there. We all feel a wonderful blooming of empowerment when we start doing things ourselves. At the same time, there's a certain self checking that we have to do when you're utilizing something and you think it might be working. Are you sure that's why? If you're getting a particular result, does it have anything to do with what you did?

The classic example is... you mentioned people utilizing medications that are theoretically preventative against a virus because somebody had a strange theory, or it worked in a petri dish, and then suggesting that because they have not gotten a particular ailment that it's working. That's totally disconnected. You also have worn shoes every day. Are you sure that wasn't the thing that kept you from getting sick? It's important to sort of have a certain clarity to try to make sure that you're not deluding yourself that something you're utilizing is having an effect when it's not. And/or isn't having some sort of other effect that is unintended. Easy mistakes to make. Again, that's not to dissuade people from experimenting or trying things but don't delude yourself.

the natural answer is immuno suppressives. The problem with that is that immunosuppressives are very rough on the system. The only immunosuppressives that are available and approved in the United States are ones that are designed to give to people who are getting organ transplants. Sometimes people with really severe autoimmune diseases are given immunosuppressive, but very rarely. Even then, still the same ones that are extremely heavy handed, they're very, very hard on the system, they can cause all sorts of nasty kidney damage, because your body has to process these things. There's a long biomedical process, I won't bore you with the details of it.

That said, it was brought to our attention that there is a drug which is a very gentle immunosuppressive, it's called Clofazimine and it's an antibiotic, bizarrely enough. One of its off target effects is that it down modulates the potassium channels in T cells. So it just turns down the activity on your immune system a little bit. It's pretty wild to see that this gentle little thing is something that you can give to somebody who has been struggling with autoimmune-presenting Long COVID for a long time and you give them one dose, maybe two, and immediately it'll either work or won't. Sometimes it doesn't, but it seems to be this thing that just clears up people's suffering very, very quickly in some cases.

Now, the weird thing is you can't get it. Why would there be this incredibly effective thing that you can't get? Well, as I mentioned, it's an antibiotic and the antibiotic action for which it was designed is against leprosy. And so despite the fact that it is FDA approved, it has not been produced or imported to the US for decades because leprosy is seen as a problem for people who are poor and not white and live far away from America. So we don't need that drug. You can import it, you can get it from overseas, places like India, Nepal, and Bangladesh, where it's still produced because it's needful.

It's one of these things that when it works is it's really amazing to see. The best part about the utilization for Long COVID is it's not something that you need to utilize in perpetuity given that you don't have something that's constantly pushing your immune

might imagine. This was the approach, this was the attitude that most of the established medical community took to Long COVID. When people said, “Look, I caught COVID and I don’t seem to be coming back to what feels like normal,” even maybe two years later or longer. People were just like, “Just give it a while, you’ll be fine, blah, blah, blah, it’s not a real thing.”

From a scientists point of view, it’s actually really fascinating because it turns out that there are these long term effects that this viral infection has and they take a whole bunch of different forms. It’s really hard to see how they’re connected. Of course, they have to be. My great hope is that eventually somebody will really connect the dots and we’ll learn something really fundamental about human biology. But you see all these strange things happening. Again, it’s still poorly understood.

The main things that are hypothesized about Long COVID... COVID comes in the one form where if you get a very bad case you can have organ damage. That’s one of the examples that very early on was scary: we got people coming out of a really bad COVID infection and their pancreas just kind of stopped working and all of a sudden, they’re diabetic. Nobody really got what that was, but of course, that’s just organ damage. People were having cardiovascular damage, where they were no longer able to go up a flight of stairs without getting winded.

But then there were these other things that looked really strange. They looked like an autoimmune disease had popped up out of nowhere, which is very, very strange. It’s not something you see in a lot of cases. But what it seems to be is that in some of these cases that look like an acquired acute autoimmune dysfunction is that somebody gets a nasty case of COVID, their body goes into hyperdrive trying to fight it off, their body stays in hyperdrive for so long that when the infection finally abates, the immune system is still in Berserker mode, and doesn’t really stop.

So, when you look at the autoimmune-presenting Long COVID, you have to ask yourself, ‘How would you treat that?’ Of course,

**TFSR:** Yeah, humility is super important in there.

So switching tracks a little bit. I want to get into some of the particulars of the things that Four Thieves have been doing over the years. So I’ve been reading Peter Kropotkin’s *Conquest of Bread* for the first time right now.

**ML:** Oh! The anarchist formerly known as Prince.

**TFSR:** [Laughs] Exactly.

I’m finding the arguments against private property and intellectual property that he makes are common among anti capitalist today. Basically, the machines, the tools, the techniques, and the knowledge that exist today are the product of countless individuals working and sharing collectively, that they are a product of common labor of humanity, and thus should be held and used in common by anyone who so desires.

The cultural spaces that have given rise to Four Thieves, as far as I can tell, seem to hold this hacking ethos that information wants to be free and the brave spirit of innovation. But similarly, the crypto anarchists world also shares base with ancaps (anarcho-capitalists), people that advocate for extreme models of privatized knowledge and privatized property as an extension of their sovereignty. I wonder if you could just talk about how it has been, for your collective, navigating these spaces and conversations around that sort of stuff?

**ML:** Ah, the former part of that is easy to address. I’d say even more strongly than “information wants to be free,” “information needs to be free!” The the concept of knowledge being proprietary or not sharing it is really a foul. The comparison that I like to make, that I think throws us into pretty sharp contrast is: Imagine for a moment that there was somebody who was dying and you knew how to save them. Are there any conditions under which you would not tell them and just let them die? Say, “That’s my idea, not yours!” And yet it happens every day. Because it is normalized to have intellectual property as a thing.

So, it's very strange, the innumerable things that are normalized just because we're used to dealing with them. But if it were more personal like that, if it were more direct, if you saw it happening in front of your eyes, I don't think I know is single person sufficiently callous to say, "Well, that's my idea, not yours, and I'm not going to share and you just have to die unless you pay me." Yet these structures are in place and as you say, "it happens every day." It happens every single day.

It happens more than every single day. I made a calculation that it's, I believe, three times a minute that somebody dies of HIV and every three minutes somebody dies of hepatitis C. We have treatments for all of those. It doesn't have to happen like this. Hepatitis C actually has a cure now. You can eradicate hepatitis C from somebody's body entirely. It's ridiculous that that's even a thing still. Drug overdoses, again, we have the technology to help this. That's not an intellectual property thing... Well, it is sometimes because the delivery mechanism, again, for nasal spray is the patented thing. So a \$1 medication costs \$90.

Again, these very strange systems that oftentimes it's not even clear why somebody will go and say, "Oh, I'd like to have Narcan on hand." You go to a pharmacy and they say, "Sure, we'll sell that to you." then you say, "Great," and they say, "That'll be \$90." It's not clear why it's \$90. Even if you ask the pharmacist, "Why does this cost \$90?" They're just given a price. They're a broker, as it were. They can't go back and say, "Well, that's because the sprayer happens to have a design patent on it and there's only one company that produces it and so they can charge whatever they want." Because capitalism is thought of as 'okay.'

Then conjugate to that and in our world and trying to deal with solutions, the solution seems to be, in most of these cases, go read the patent. "How did they do it? It's just a sprayer?" "Well, gosh, there are a whole lot of nasal sprayers on the market. Do you think you could get the stuff that comes in a vial that only costs a couple dollars and just dump it into a nasal sprayer? Probably?" "Let's read

**TFSR:** Yeah, no, absolutely. I was trying to make a joke because it's also used to like to clean heads on VCRs. So that was like a big source of how people were getting it in the '80s and '90s was going to electronic stores.

**ML:** I love that. I didn't know that. See, what just happened between you and I is a great example of where you're talking about something that's useful but it's controlled in certain ways. You look for other places where it crops up, where it can then be utilized for other purposes. Warms my heart.

**TFSR:** It's not a bug. It's a feature.

I wonder if one of the things that y'all had found that you were discussing on some of the podcasts (and if you don't want to talk about it here, that's perfectly okay) was the application of certain medications to help certain people that may be suffering from certain issues that are clumped under the name Long COVID.

**ML:** Sure, yes. I'm happy to talk about it. I will have to give a handful of provisos because, as you say, Long COVID is a really umbrella term. The thing that we managed to get lucky enough to uncover is rather specialized within that. There are a whole host of problems surrounding Long COVID. The first of which is that for a long time, it was entirely discounted by the medical community as hysteria. That it was just this strange thing, 'totally psychosomatic, nobody's actually suffering from anything chronic after having a COVID infection, this is ridiculous. Go away, you bother me.' It really had this flavor of chronic fatigue fibromyalgia, which again, really often gets the same reaction from the established medical community of, 'We don't know what this is. So we're just going to say it doesn't exist.'

**TFSR:** 'You must be making it up.'

**ML:** I don't want to get too epistemological about it, but the attitude is, 'if it is outside the sphere of our understanding, we must treat it as though it does not exist.' It's often the attitude of medical professionals that medicine is restricted to the whole of what they understand. Which of course leads to a lot of shortfalls, as you

from a self interested standpoint?” From a self interested standpoint, they don’t want to spend the extra money. It’s not worth it for them to push it through. But their response was, “Oh, we found that there’s a side effect of headaches when we give it to women.” Well, first off, that’s not really true. Headaches are a side effect of Viagra that kind of happens across the board. It’s not that much of a concern. But the one study that was done utilizing Viagra for menstrual cramps, they noticed that that mechanism for headaches comes from taking it orally. That it goes through this first pass metabolism in the liver and the secondary metabolites and things that cause the headaches. If you merely take 100 milligrams of Viagra vaginally, it can be very effective against cramps and will not give you a headache. You do not have to go through this first pass metabolism in the liver, it perfuses directly into your bloodstream and in the general region where you’re trying to get it to be effective.

Anyway. That’s my particular favorite story in terms of things that outraged me in terms of there’s a perfectly good way to treat this, something that affects half of the population 12 or 13 times a year and is incredibly debilitating and can just not be. So additionally in the ‘70s when amyl nitrate was an unregulated recreational drug and you can get poppers anywhere. That’s something that is a very, very quick vasodilator in the smooth muscle tissue and can put a jump on any menstrual cramps.

**TFSR:** Is this where we learn about Big VCR as an industry. I’m just kidding.

**ML:** Oh, I don’t know about that. But if you suffer from menstrual cramps, crack a popper and take 100 milligrams of Viagra vaginally and they’ll just go away. If you do do that and manage to cure your menstrual cramps, I encourage anybody who has succeeded in doing so call in to work any way. Take the day off. You’re not being an effective worker, you’re sabotaging capitalism, and it’s your duty. So just take the day off. You deserve it.

up on it and check! Is it the same formulation? Well, it’s probably close.” “Is the concentration maybe a little different? You have to adjust dosage? Yeah, probably maybe.” That’s a little bit of arithmetic that anybody could do.

Most of the battles that we fight are surrounding the notion of intellectual property. Most of the barriers that you see, and most of the tragedy that occurs from people not having access to medication is rooted in this very antiquated, really bizarre notion of intellectual property. And before I address the notions that anarcho-capitalists have of it being okay or even good, there’s a socio-cultural phenomenon that’s happening on the political level that you see happen in history, from time to time. There are these watershed moments where economics and morality come to an impasse.

Examples of this are the Cold War, the Reformation, slavery in America is a really classic example. In each of these cases, you have moralists saying, “What is happening here is not okay, and needs to stop.” And the response from those defending the status quo says, “This is how our economy works and if we just stop, it pulls the rug out from under all of this.” Then the response is, “Well, that’s not good enough. If this is what our economy is based on, then the economy is not okay and we need to have something new.” Again, you see this parallel in each of these cases, of course, American slavery is one that your listeners will know well.

It’s a really basic argument: People cannot be property. Again, when you look at the discourse of the time, the response came, “Yes, yes, we know that the notion of slavery is a little antiquated, and sure, it’s not very good and we don’t really agree with it. But this is the way we’ve built America and it couldn’t happen unless we had this endless source of free labor.” The response was, “Well, that’s not good enough. If this is our economy, we need to build something new.”

That seemed discourse is happening currently with what you just pointed out. There is this notion of intellectual property and

there are these arguments for it. Some of us coming out saying, “This is not okay. People should not be dying because there is a legal control on ideas.” Knowledge belongs to humanity. It’s a very simple notion. Without getting too complicated, if somebody is having a medical problem, it is preposterous to say that that person can’t get treatment because somebody else owns the idea and has some sort of government given right to be able to profit from it.

Often the response is very similar, where people say, “Yes, yes, okay, right. The notion of copyright and patent comes from very old ideas and yes, the system’s not perfect and yes, it’s being abused and yes, it’s really, really unfortunate that all of these people who have nothing to do with this system are dying unnecessarily... but this is how our system works and there’s \$4 trillion circulating the globe based on this system. We can’t just stop that, can we?!” There are some of us who are saying, “That’s not good. If that’s your economic system, then you need something new because this is not acceptable.” We’re doing the best we can to try to say, “Not only is a new system necessary, but we have no respect for your system, and we’re going to circumvent it and subvert it if it means that people who are sick are going to live instead of die or be healthy instead of sick.”

I’ll just add one more thing. Since I mentioned this life and death barrier. Oftentimes, there’s this very nasty ableist approach that people have in their argumentation of this, “Oh but did you die” sort of thing. If it’s not a disease that is going to kill you soon, there’s the sort of dismissive quality of, “Oh, you will live, so we really aren’t responsible for what kind of suffering you might have.” I think it’s really turns a blind eye to the fact that when you’re ill, if it doesn’t kill you, if you’re incapacitated by that, even something as basic as just having the flu for the weekend, you can do anything that day. If you think about that, it doesn’t deprive you of life, but it deprives you of the capacity of participating in the things which make life meaningful. So this this goes all the way down and it makes me a little grumpy.

in terms of trying to treat muscular dystrophy and osteogenesis imperfecta.

My personal favorite of all these stories, there are a lot of these stories and ways that you can find, I don’t want to say secret uses but lesser known uses for drugs, is the history of Viagra. Viagra, of course, was one of the first so called blockbuster drugs. I think most people know the history that it originally was this heart medication. It works to be a vasodilator in smooth muscle. This is what you’re trying to have happen when you’re trying to get better blood flow to the heart. The story goes that originally they were testing for this and a lot of the men in the male cohort that were being tested came back and said, “We’re unexpectedly getting erections after we take the drug,” and the company decided to pivot.

That’s not the whole of the story. The story was there were actually two cohorts, there was a male cohort and there was a female cohort. The female cohort came back and said, “None of us are getting menstrual cramps anymore.” They said, “Huh, that’s kind of interesting,” and then men came back and said, “We’re getting erections,” and they said, “Ladies, thank you for your time you can go home.” That was the end of that. However, Viagra is incredibly effective as being an intervention mechanism for menstrual cramps. It’s just something that’s not known.

Menstrual cramps are seen because of institutionalized medical misogyny as just part of the deal and you just grit your teeth. The reality is that there’s a very specific mechanism of action behind menstrual cramps and you can intervene. There are lots of medications that will help that. Viagra being one of them. There’s just no support for it, nobody seems to care enough. The information isn’t out there and nobody will fund studies for it. There was one terribly underfunded study where they just tried to refute some of the claims.

A lot of people cried out and said, (I believe it’s Pfizer that owns the patent on Viagra) “Why have you not applied for approval to get this to be made into a menstrual cramps medication? Even



ing and they looked specifically for any drugs they could find that had miscarriage as a side effect. Things that were specifically contraindicated in pregnancy and resulted in miscarriage. They found that this weird ulcer medication happened to have this as a very high risk. They looked at it, and they just tried it and it worked really well. Only after that was adopted by the medical community as this very effective medication!

So there's a long history of this. There are a few books out there that are catalogs of off label uses for medications. Most of them aren't terribly useful, because the uses are fairly adjacent. But sometimes you find things that have these interesting off label uses. Maybe it was something that they were originally used for but didn't pass in the approvals process and so they were marketed for something else, because that's how they could push it through the FDA.

Sometimes you find things that just aren't targeted for people that society cares about. A really great example of that is when you look at muscle wastage and when you look at bone demineralization, this typically happens to cross sections of the population that society on the whole doesn't much care about. Typically, if you have muscle wastage or bone demineralization, it means that you were either born with osteogenesis imperfecta, muscular dystrophy, or you're aging, or you're in advanced stages of some chronic disease. One of the things that we've learned to do in our own research process is when we look at a problem like this, ask the question, "Is there a different demographic of people who suffer from something analogous that society might care a whole lot about?" Maybe there's different research that doesn't have the same tags.

Indeed there is. Muscle wastage and bony mineralization are a huge problem for astronauts. Even though they're only a few dozen astronauts in the whole world, apparently, society thinks they're very important. People who are just suffering don't matter, but the therapy is the same. So looking at some of the signaling mechanisms that are used to inhibit myostatin are very promising

**TFSR:** The read that I get off of your project is it's about engaging with these fundamental ideas of how property is experienced, the way that people engage with their own bodies, how they engage with knowledge and the profitability of certain industries to reap billions, trillions of dollars off of people's ability to have better quality of life. But I know that outside of the possibility of just toppling all that y'all do have impacts on the way that the medical industry operates.

It's not just you, there's lots of people clamoring for reductions in costs to medications or legalization of generics in various places, ends of patents. There was a ton of advocacy on the left, at least, in the US and worldwide around private companies that had used a ton of public funding in order to develop the mRNA COVID vaccines and still continuing to hold on to the patents or give a promise of a limited release of that information. Although other countries were developing them in the face of this virus that continues to spread and circulate and adapt and modify itself in such a way that it's creating more death and misery. Hypothetically, we could have wiped this out if there had been a good enough effort and sharing of information.

A little rant out of the way. I'm a little miffed too!

**ML:** We all should be. I think it's important. I think that it's not expressed enough.

**TFSR:** Eli Lilly recently dropped significantly dropped prices on insulin after years of pressure from various quarters...

**ML:** Let me ask you, how blue is your podcast? Is cursing acceptable.

**TFSR:** You can swear as much as you want to. I'll end up editing stuff for the radio edition, anyway.

**ML:** For your listeners who don't have delicate ears, allow me to say, 'Fuck Eli Lilly.' They are not dropping the price out of any reaction to political measures, pressure, public outrage, petitions, or any sense of altruism. They're doing that for one reason, and one reason alone: it's that they know that their competitors are

about to do the same and they're trying to undercut them. They're getting some nice press out of it as well. But they are not doing this because they care. They do not care. They have never cared and they will never care.

**TFSR:** Well delivered. I'm not meaning to praise Eli Lilly for this.

**ML:** I was not suggesting you were. I just wanted to clarify that, because a lot of people have been.

**TFSR:** Any of these corporations are not doing anything out of... No matter how many legal rights they have under the US system, they are not people. They cannot be influenced on an ethical level. they can't even be executed. However we can.

One thing in this vein, as it were, actually its subcutaneous so I guess the joke doesn't really make sense. But can you talk a little bit about y'all's interventions into insulin delivery?

**ML:** We haven't done much with insulin yet. It's something that we were looking at recently. But the really interesting stuff that's being done with insulin currently is the Open Insulin Project that's run by Anthony DeFranco and a number of other really sharp, gifted people. My hat is off to them because you know, for myself, it's pretty easy to operate publicly. I call myself bioterrorist because it's this abused word and I'm trying to just reappropriate it. Four Thieves is not fettered by legal constraints, or internal red tape, or trying to get approval from the FDA, which is an independent entity outside of any legal systems that makes internal decisions that are arbitrary and are made up by people who are appointed rather than elected, etc, etc.

When you look at a group like the Open Insulin Project, they have a very brave undertaking, which is they're trying to operate within all of those constraints, and still produce insulin. This is very difficult, they're trying to and have succeeded in a number of the bits and pieces of the undertaking to genetically engineer a strain of bacteria that produce insulin as a metabolite, which can then be filtered out and packaged for use. That's quite the undertaking.

commercially available. Let's only work with precursors that are affordable at certain price points," and, and so on. It makes doing the research portion of the chemistry much easier.

Additionally, we have this new version of the micro lab, which is this tool that allows you to do chemistry at home, it automates the hard parts. We have a new system called the recipe press that allows you to use a graphical user interface to generate the code that the machine will run. So, if you do have a process for making one particular molecule, you can generate a file that will run on the hardware.

We've had a handful of others, but there's there's a lot. Unfortunately, most of our talks this summer weren't recorded because of infrastructural problems that happened at conferences we attended. But we are currently recording a bunch of short-form videos for each of these little projects and we're going to be releasing the first of those on this coming Monday, I believe.

**TFSR:** So those online tools that you mentioned are for people who are in the process of actually applying the knowledge. I went onto the website and messed around with those a little bit. I'm like, "Okay, well, this is way out of my range." I think if I was in the process of trying to do the research, then I would know how to use the tools.

I wonder if you could talk a little bit about the reapplication of FDA approved medication, particularly the one concerning Long COVID?

**ML:** Sure. There's a long history of usage of FDA approved medications for other uses when you find side effects, so called side effects, which maybe are the target effects that you want. You can merely hijack that medication for that usage. A great story that I love, is the development of Misoprostol as an abortion medication did not come out of academia. It came out of a group of radical, Brazilian feminists who were trying to figure out how out to give themselves medical abortions and what they did, which is just so unbelievably gutsy, was they did their research, they did their read-

to you in an ambulance. Maybe there's not enough time for that to happen. We should have it.

So, looking at the development of a biomedical engineering team from 2017, they developed an open source AED, and it was just a proof of concept thing and they sort of didn't do anything with it, which is a real tragedy, because it's an incredible tool. So our biomedical engineers have been going through, and we've needed to update a few things, because some parts of obsolesced. But soon, we will have instructions on how you can order all the parts and if you are an intermediately experienced electronics hobbyist, you could put this together in a weekend for about \$600 and then you can just tuck it away for a rainy day. Of course, hopefully, you never have to use it like so many other emergency devices, but by the time you need it, it's too late to go get one. It makes all the difference in the world.

A few other things that we did over the summer: we had a series of off label uses for FDA approved medications. Again, being who we are, we surprised a number of people because most people say, "Well, you guys don't care what's approved, you only care about what works!" Yes, but generally, those things which are approved, work pretty well. If you're doing an N=1 clinical trial, to sort of see if something works, you can really cut the learning curve if something's already FDA approved because they've already determined that it's probably not super toxic. In most cases, you know what sort of side effects to look for, you have a target dosage that you can use, and so it gives you a big jump on your research.

Additionally, we have a bunch of online services that are now live. So, if you're doing your own reading, you can have it help you through the process somewhat. There's a very clever machine learning algorithm that will dig through the chemical literature and do what's called Retro-Synthesis Analysis and take any active molecule that you give it and run back and say, "Well, how could you build this?" It's very highly customizable. You can give it parameters to say, "Oh, yes, let's only work with precursors that are

**TFSR:** That would be amazing.

**ML:** We considered doing things that are analogous, but the Open Insulin Project seems to be on track. I think that the public support for [free] insulin is going to be less, unfortunately because of this stunt that Eli Lilly played, where people are going to say, 'Oh, it's only \$30 now!' First off, that's not even true. It is \$30 if you are on Medicaid and this is the only system that you need. If you're a kid or you need an insulin pen, then instead of being \$30 a month it's \$350 a week. To say nothing of the problems that surround if you're using a glucose monitor and/or an insulin pump. None of these things are covered, all of them are under patents. Additionally, those are super dangerous because they're black boxes and not open source. You're entrusting your cyborg add-on to work without knowing how it works. Which is super sketchy.

There are people with the [Open] Artificial Pancreas Project with whom we're also friends, who've done some really great work where you essentially do a man in the middle attack between your glucose monitor and your insulin pump. You can get it to run the way you think it should. Which isn't just like a taking control of your medical autonomy, it also makes it run better. Because legally, and again, this is this weird liminal space where the play between what is medically best and what is allowable by law is highly differentiated. You're only allowed to have an automated device push insulin based on a cut off. If your insulin levels are dropping, anybody looking at that and any computer that you can program to have, a PID algorithm can anticipate and say, "Oh, your your insulin is going to crash or your blood sugar is about to spike, or the other way." Instead of waiting for that disaster to happen and then compensating for it, it can slowly compensate for that in advance.

The stories that come out of the artificial pancreas project are just so heartwarming. People who are diabetics who slept through the night for the first time in their entire lives, not having to wake up and take insulin because the system took care of it on their own.

The way those of us who are lucky enough to not have diabetes, our pancreas compensates in real-time all night.

I think insulin is a real heavy front in this war. You see all of the difficult things that happen with the barriering of access to critical life saving medical technology are manifesting over insulin. It's kind of a microcosm. We hope to help out with that. Not quite sure which form it's going to take now. The landscape is shifting. All those people are friends of ours, and we hope to support them every way we possibly can.

**TFSR:** Yeah, that's awesome. I'll be sure to put links in the show notes to those two projects.

I know that on your website, for instance, you have a few different projects that you've listed out. And there's some good information on there about them. One technology that you have developed is the epi-pencil of epinephrine injection...

**ML:** It's okay, it maybe easier for me to go through a couple of them?

**TFSR:** Yeah, please. Sure.

**ML:** So yeah, we've done a bunch of projects over the years. There are a bunch that we release over the summer during our lecture tour that we're now going to start releasing videos on. One of the things that we were trying to capture the public attention with are these abortion cards. We've figured out a way to dose abortion medication onto paper. So we have these little business cards that you can just cut into squares and you put in your mouth in a certain order. It's no different than the way you would normally take Misoprostol and take tablets and tuck them in your cheeks to induce an abortion. This, of course, is really nice because it's just a card, so you can mail it in a letter. It's not going to be sorted out by rigid-object-detectors or things that normally will catch pills in the mail and intercept them.

The other things that we came out with this summer were the open AED project. Defibrillators are about the most magical medical device that's out there that's available for people who are un-

trained. Somebody has what looks like a cardiac event and you take these pads off and you stick them to somebody and turn the machine on and it runs an EKG and sees if somebody is in one of these so-called "shockable rhythms," which are ventricular tachycardia and ventricular fibrillation. Those are just when your heart kind of freaks out and the electrical signals are confused and sort of cycling in a weird way. That can be fixed with the shock, the electric shock, and that just resets it.

If you have ventricular tachycardia or ventricular fibrillation, the difference between 'you died' and 'you woke up on the floor and say, "Why am I on the floor?" is just how long it took between when your cardiac event happened and when the pads got stuck to your chest. About nine minutes, roughly, is your window. So the solution to this is that everybody should have one in the house, like a fire extinguisher or like a carbon monoxide detector. Like any piece of safety equipment, you should just have it in the house in case. Aspirin, Benadryl, all these basic things, everybody should have an AED. The problem, of course, is that typically AEDs cost around \$6,000 and most people aren't ready to plunk down that kind of cash for something that they don't think they are ever going to use because it's just sitting under the bed. But it makes all the difference in the world when Uncle Buck slumps over at the dinner table and you don't know what to do.

Why are they so expensive? Well, again, it's because these systems have to go through medical regulatory processes and are all under patent. People can charge whatever they want and this concept that you mentioned moments ago that "the bottom line is the bottom line" and that companies are looking to recoup their costs. So they make giant profits, which is the real driver. That's where the price point for these things landed. In very rich places, you see there are AED's on the wall in every place. But most people don't have that. If you live in a rural area, or you live far away from regular infrastructure, you are waiting for someone to bring an AED