

# An Interview with Andrew Hessel

## Founder of Humane Genomics

By Josh Wolff

The front cover of the April 2019 issue of the Economist is emblazoned the headline: “Redesigning life: The promise and perils of synthetic biology.” This is a new issue, one that will be a defining topic in medicine for at least the next 100 years.

Andrew Hessel, founder of Humane Genomics, has had to deeply consider both the promises and perils, ethical and technical, of engineering biology.

He wants to cure cancer with synthetic viruses. But first he wants to cure cancer in dogs.

When Andrew Hessel first replied to my email, he signed it with, “Sent from my neural interface.” When I asked about this, he said, “It’s not there yet, but eventually.” He may have a sense of humor and he clearly lives in the future. In fact, he always has been.

*Q: You decided to not have kids when you were 10?*

“Well, yes... but that did not really work out. I now have 2 kids. My oldest is 4, and I am in my mid-50s, so I am at the stage in my life where I can be playful with my kids, and not excessively serious. It worked out nicely. Everything has just sort of fallen in place and I am extremely fortunate.

I went to Calgary for biology and was able to study molecular biology and cellular biology and I really enjoyed it. Then there came a time when I decided that the best thing to do next was to go to the United States.

I considered a few positions as a Medical Laboratory Technician, and they showed me a few of the roles and they said, ‘Andrew, you will be way too bored in these.’ I started on a Ph.D., but left to join industry, which was an incredi-

-ble learning experience. I started at one of the largest biotech corporations in the world –”

“Amgen?”

“Yes, Amgen! And that is where I really got to learn a ton.”

“So, you never completed your Ph.D.?”

“No, and that might have been a mistake, in retrospect. Science is really sort of a club, and to be taken seriously you need a Ph.D. But working in industry has been very useful though. I was able to see the business management side and the technical, scientific side – and be empathic to both.”

*Q: Ah, OK, so working at the time – let’s see that was around 30 years ago, so you ended college around the tech boom. Did you feel like you needed to be a part of that?*

“Well, I have always been a part of the tech boom. I have been alongside this industry since the very early stages and have been able to witness rapid technological advancements.

I have been able to watch the field grow over time, and luckily, I have been a part of this very early. We have inexpensive computing and powerful machine learning algorithms, available to anyone online; we have continually cheaper and better DNA sequencing and synthesis – I mean, all these have just mushroomed – all of these things that continue to offer new tools to better attack this problem.

“You’ve been in the midst, sort of watching and waiting.”

Talking to Andrew, you get the sense of a Reed Hastings, the founder of Netflix, who waited until the time was right to enter the industry with his long-term vision of a streaming service. Until the technology had advanced, he made a direct-DVD rental service via mail, which was how Netflix first started.

*Q: I have heard before that proprietary datasets are critical to an AI-focused company. As a founder of a company that deals with such datasets, how do you feel about this claim?*

In a previous article, I interviewed James Hardiman, a partner at Data Collective, who made this claim.

Hessel answered, “Now, we do not want something where there is a giant biotech version of Microsoft that has sole access to everyone’s genome. We would much rather prefer something like Linux, where the software, the data, is completely open source. I actually wrote a chapter in O’Reilly Media’s Open Sources 2.0, which features open-source in biotech.”

For those curious, the chapter is titled “Chapter 18: Open-Source Biology.”

“Now there are a few cards that I do keep close to my chest. In that regard, in machine learning, you have to train these algorithms on massive datasets. We envision open sourcing our datasets, but not precisely what we do with them.”

*Q: Now I see that you have been working on your company for a couple years – Humane Genomics, is this your first company?*

“Well, I first co-founded a cooperative biotech company [Pink Army] in 2009 that taught me many lessons but wasn’t a commercial success. From 2012 – 2018, Autodesk supported efforts to prototype synthetic viruses and nanoparticles. We made steady progress. In 2017, Humane Genomics was incorporated to build on this foundation. We have received \$100,000 in support from Deloitte Health Care and Life Sciences to advance our work.

“I tried to do this as a CO-OP originally but found that I am much better at building a technology product than a community, and for CO-OPs, it is significantly harder to get investment. We rebooted as a C-corp and that’s what we are today.”

Going back to our Reed Hastings comparison, Hastings relied on the predictability of Moore’s law that allowed him to determine approximately when streaming services would become technologically possible.

*“..we have Eroom’s Law where the money and time it takes to develop a drug has become exponentially greater..”*

Hessel referred to this phenomenon when describing the motive behind his vision for personalized medicine. “For something like transistors, Moore’s Law applies, where you get this doubling in capacity and exponential growth. However, with drugs, it has been the opposite. We have Eroom’s Law [Moore spelled backwards], where the money and time it takes to develop a drug has become exponentially greater.”

Hessel continued, “You have these drugs that target rare diseases, and a treatment costs \$100,000 a month for a small subset of the population. Without treatment, the hospital-stay and bedside care costs \$150,000, so they will tell you that you are saving \$50,000!”

“Well, that’s just impossible to afford.”

“Impossible.”

*Q: And in comes you. And you are going to change that how?*

“Well, we sort of threw small molecule drugs away because, while you can computationally predict those, we have no idea how they are going to end up in the body and what kind of reaction will ensue. We began with biologics to remove this hard-to-predict problem. Cells, viruses – are all machines, in a way. And they’re programmable.”

“We began by making a synthetic virus totally from scratch.”

“Totally from scratch?”

“Well, it’s not as difficult as it may seem. And hardly anyone is doing it. If you look at the number of viruses that have been sequenced, there may be around 8300. If you look at the number of viruses that have been synthesized, there’s around 30. This field is ripe for growth.”

“Now, I cannot help but think – I am Legend.”

Andrew grew very excited at the reference. “Yes and Dr. Alice Krippin creating the virus for cancer and then everyone turns into zombies and the whole world implodes – but no zombies allowed here! I always say my cancer fighting

*Q: Ha ha, yes! Exactly! Now what is going to stop you from becoming Dr. Krippin?*

“Well, these cancer-fighting viruses have a very short lifespan. They replicate in your body’s cancer cells, which then lyse and infect other cancer cells, but your immune system gets rid of them pretty quickly. They do not have the much time to mutate and affect other areas of your body or become some sort of infectious agent.”

“Now, this is a very clever trick.”

“Yes, the medicine is actually produced by your own body’s cancer cells and then dispersed throughout the body, to hunt more cancer cells.”

“Why work on cancer? Why not some other disease?”

“I look at cancer as an easy problem, which is somewhat controversial. Not everyone sees it that way. Really, it’s an antibiotic-problem. We have an infection, but it’s not with a bacterium, it’s with some of our own cells. There are many ways to kill a cell. The challenge is in targeting – cancer cells are not all that different from normal cells.

“Because each person is different, every cancer is different, so we need to build something that is personalized and scalable, so that every person gets their own custom-made synthetic virus to treat their cancer.

I attempt to put it simply. “In a caricatured way, I have my phone, I breathe into it, and the next day, Amazon Prime delivers me a synthetic virus for the cancer I was diagnosed with.”

“That would be amazing. Something to work toward. And as transformative as mobile phones – to really democratize the process and make it affordable and suitable for everyone. There just is no one-size-fits all solution to this problem.

“Those who helped build some of the first synthetic viruses were extremely generous with their time. They were passionate about the idea and helped us develop this initial concept.”

*Q: Sort of like an MVP [minimum viable product]?*

“Not an MVP. I do not look at it like that. I see it as continuously refining the drug development process and the customer experience. These are patients – no, not ‘patients.’ I really don’t like using that word – people. We just want to help people with cancer better.

“We see it as the transition from Blockbuster medicines to something that looks more like Netflix. You go from a being offered handful of hit movies at the store, to an unlimited and totally personalized experience.”

Yup, he is actually just Reed Hastings, pharma-version.

“In the long-term, it makes sense for this to be a subscription service. Once a month, you get screened for various cancers, and if something comes up, you are able to get treated and go to work the next day. Right now, there are liquid biopsies being developed which are extremely sensitive and could find very early cancers with a routine blood test.”

I followed up:

*Q: What will it be that allows you to achieve these goals?*

“It is extremely important to be laser-focused on execution and have a great team. We need super smart people that can make this their life’s work.”

“And what do you typically look for when you have sought out investment? A shared vision, a biologist with extensive background in viruses?”

“Oh, there’s a whole mix of these types of investors, and actually our first investor gave us sort of a grant – no strings attached. We have been making the most of this investment, and that is what powered us through this first phase. Now, as we move on, we are going to need to raise a significant amount of money to begin refining our process and growing an incredible team.

“They need to see the potential here. We will also be seeking out investment and trying to find incredible investors who believe in our mission just as much as we do.

Hessel, concluded, “I mean, this has just been an incredible learning experience for me over time. This has sort of been going on for the last 15 years, but things that didn’t exist before are enabling us to accomplish more, and these advancements are only growing over time.”

*Q: So, what’s your next step?*

“Dogs. Starting by treating cancer in dogs incurs fewer risks and gives us a chance to develop our delivery platform before moving on to humans. This is an area that is very underdeveloped – personalized canine therapeutics for cancer – and we are going to refine our platform, maximize client experience, and get clinical data.

“Someday people will be saying that their dog is getting better treatment than themselves! Once that happens, I think that transition to human therapeutics will be pretty smooth.”

“That would be quite ironic.”

Imagine, your dog could be cured of a cancer that would otherwise be fatal for you, had you contracted the same type. A strange future indeed. A transition from curing dogs to curing humans may or may not be smooth, but it would undoubtedly be in high demand.

My discussion with Andrew Hessel was certainly unique. It illustrates that this is not some crazy idea he had spontaneously – he has been sitting on this, toiling with it, daydreaming about it for 15+ years. Now, it seems that the time is right more than ever for him to execute his vision for humanity.

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