JAKE SIEWERT

Welcome to *Exchanges at Goldman Sachs*. I'm Jake Siewert, global head of Corporate Communications here at the firm. Today I'm joined by Heath Terry of our Global Investment Research Division. Heath is a close observer of venture capital, both the startups that are seeking it and the investors who are providing it. Once a month he publishes a report called *Venture Capital Horizons* where he explores topics at the center of conversations in the VC community. This month Heath is going to take us into the world of computational biology in an audio segment he produced for the podcast. Heath, thanks for being here.

HEATH TERRY

Thanks for having me, Jake.

JAKE SIEWERT

Before we dive into our first episode, why don't you tell us a little bit, Heath, about your own

background, how you got here and what you do here at Goldman.

HEATH TERRY

I've been with the firm about nine years now. My primary job is to head our global Internet research coverage, but I also built the *Venture Capital Horizons* group out of the focus that we have on early-stage companies and venture capital.

JAKE SIEWERT

And how do you discover the companies, entrepreneurs and the topics that you cover?

HEATH TERRY

I cover the Internet sector within Investment Research, and so the competitors, the disruptive threats to those companies within technology have always been not the incumbent technology companies but the venture-backed startups, the guys in the garage that were always going to be the next big thing to come down the pipe from a technology standpoint, from a competition

standpoint. So we've always kept a really close eye on venture capital, and VCH sort of evolved out of that.

JAKE SIEWERT

So the very first episode of this will be on computational biology. What is that, and how do you find your way to that particular topic?

HEATH TERRY

So computation biology is fascinating. It's the intersection of biotechnology, artificial intelligence and robotics. One of our very first VCH reports looked at regenerative medicine which is an area that's relatively close to this one, and in conversation with Nathan Benaich who's the founder of Air Street Capital, a venture capital firm that's focused specifically on artificial intelligence, and he had just invested in a company called LabGenius which was a computational biology company and, to be honest with you, a term that we hadn't even heard before.

And so one of the things that we do when we look at this, is we look at the data. We actually build essentially a word cloud looking at terms that are showing up venture capital for the first time. And for the first time in 2019, computational biology showed up on that on that list.

JAKE SIEWERT

Showed up out of the cloud.

HEATH TERRY

Exactly.

JAKE SIEWERT

All right.

HEATH TERRY

We connected with not just LabGenius' founder, Dr. James Field, but also Zavain Dar at Lux Capital who also was invested in LabGenius. Lux Capital is one of these really early-stage venture capital firms that is sort of known for wanting to invest in science fiction level technologies, and so we started digging on that side and then got really

lucky as we were talking about this to some of our colleagues internally to find out not only do we have all of these resources to learn about this outside the firm; we also happen to have a PhD fellow, Elizabeth Webster, inside the firm who did her thesis on computational biology, and so we got lucky there.

JAKE SIEWERT

All right. Sounds cool. Well, without any further ado, I will turn it over to Heath.

HEATH TERRY

Our bodies contain trillions of cells and, therefore, trillions of pieces of information, most of which we still don't understand. Over the past two decades, we've been able to access some of that data, genetic sequences, protein profiles and molecular interaction networks, for example. But understanding that data has been a time-consuming and expensive process.

Computational biology changes that. It applies algorithms and statistical models to biological data. It leverages machine learning and artificial intelligence to make better, faster sense of our biological system. Computational biology has ramifications across health care. It can help find new drugs faster, design new proteins to cure diseases and accelerate our understanding of genetic code to help prevent diseases before they strike. The potential for computational biology and its wide range of applications has made it a recurring theme in my conversations with investors, investors like Zavain Dar, a partner at Lux Capital, a VC firm focused on emerging science and technology.

ZAVAIN DAR

The last 15 years or so have shown so many incredible advances in our ability to perturb and almost engineer biology or perturb chemistry and create these enormous datasets of high

reproducibility, of high fidelity and massive scale that really 20 years ago were unimaginable, and so when you couple that with something like ML or AI, it feels like we're at the precipice of what I think will be a multi-decade revolution in how biology and chemistry are fundamentally practiced.

HEATH TERRY

My colleague, Elizabeth Webster, who happens to actually have her PhD in the study of computational biology connected with Dr. James Field, co-founder and CEO of LabGenius, a private computational biology company headquartered in London that's become one of the top startups in the field to watch. LabGenius uses proprietary, autonomous machine learning technology to aid the discovery of useful proteins for the human body.

JAMES FIELD

Biology is incredibly complex, hairy, messy. Computational biology is a set of tools that enables

us to start reasoning with this biological data, and machine learning is this really powerful approach that we can apply onto this domain that enables us to start searching through that biological space in a more rational way.

ELIZABETH WEBSTER

There's always going to remain a degree of the unknown, around biological processes more broadly. How does your technology handle this?

JAMES FIELD

Machine learning enables us to in silico interrogate new genetic designs that we've never physically made before and come up with some predictions as to whether those will function well in the real world, and the reason that's really important is because high-throughput molecular biology enables you to build and test millions of these different designs physically in the real world in parallel.

But even if you're testing millions of different designs physically in the real world, it's only the tiniest proportion of the total molecules that you could be exploring, and so you have to have some way in order to make those shots on goal likely to score, and machine learning is the technique that enables you to do that.

ELIZABETH WEBSTER

As your company grows, how do you think about balancing pursuing go-to-market opportunities with also pushing for technological breakthroughs?

JAMES FIELD

So as this wave of technological advances sort of entering the world of biotech, and I think this is the thing that maybe opens up a way to do things slightly differently. If we can deploy technology in building out some discovery platforms in a way that the learnings compound over time, then it will dramatically change the economics of discovering and developing these sort of drug molecules.

HEATH TERRY

In our research and analysis, we're increasingly seeing computational biology startups position themselves in the way that Dr. Field describes, as software platforms that connect related parties in the pharmaceutical development process. By connecting experts in biology with artificial intelligence and machine learning talent, computational biology companies are aiming to make breakthroughs more efficient and scalable. This could lead to a cut in R&D costs and a streamlining of FDA involvement for drug research and development. That streamlining can disrupt business models is something Zavain has seen firsthand.

ZAVAIN DAR

Five or six years when we first started investing in these spaces, you know, a lot of the established kind of vanguard of investors kind of scoffed and laughed at us, and now it feels like almost every

other week those same people come to us and ask us for advice in investing in those areas, or they're writing blog posts, and they're putting their flag down and saying, "Hey, look. We're active here too. We're not just kind of traditional biopharma or traditional kind of biotech."

HEATH TERRY

With computational biology still largely in its early stages and constituting a small share of the nearly $35 billion in annual global venture capital funding in health care, the jury may still be out on its long-term ability to customize therapeutics, revise drug compositions or sequence the human genome, but we do know two things. Computer power and algorithms continue to improve, and what we know about how biology works is accelerating. Computational biology is sitting at the intersection of those two trends, promising to transform industries, up-end business models and, most importantly, radically improve health care across

the globe. We'll be back with another episode next month where we'll look at the role of nuclear power in sustainability. Until then, I'm Heath Terry with Goldman Sachs Investment Research. Thanks for listening.