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Subcommittee on Oceans, Science, Fisheries, and Weather

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Chairman Gardner, Ranking Member Baldwin, distinguished senators, ladies and gentlemen. Thank you very much for the invitation to testify today concerning House Bill 4373.

I represent Inscripta, a company headquartered in Boulder, Colorado, that is developing new tools for genome engineering. As Chief Commercial Officer, I am incredibly excited about the opportunities for startup companies like ours to help accelerate the development of the Bioeconomy through the creation of advanced tools for genomic research. But we need your help. Without careful government attention to issues like workforce training, regulation, intellectual property, and standards, we may lose our ability to be competitive and lead in the global Bioeconomy.

I'm here to address engineering biology, sometimes referred to as synthetic biology. Both fall under the broader category of biotechnology, a term you are likely to be more familiar with. Traditionally, when people think of biotechnology, they think of the innovation hubs on the East or West Coasts – Boston or the San Francisco Bay Area, for example, where this industry was born. But the opportunity we are here to discuss is one that has the unlimited potential to bring a new economic boom to every corner of the U.S, including those left behind in the current economy.

It involves using natural, bio-based materials to design and manufacture a wide range of products in a more sustainable way. This includes better ways to feed, clothe, fuel, transport, and shelter our citizens, among other things. In fact, there are few industrial sectors that will not be touched by the Bioeconomy.

In the Bioeconomy era, rather than make products from raw materials dug from the earth or created from harsh chemical processes, we will produce them from biological ingredients produced by microbes that will be engineered to be living factories. The beauty of this approach is that nature has billions of years of experience in making highly complex, sustainable materials through the power of evolution. We can harness this power and direct it to create the products we want and need for our growing population.

This has the potential to reinvigorate historical bastions of manufacturing such as the Midwest – and any region that wants to join in on the revolution – because the tools needed for this type of manufacturing will be widely available, easy to use, and affordable. Much of this work today is based on fermentation, using source material that can be sustainably grown wherever land is abundant. For example, companies are already using yeast fermentation to sustainably produce important components such as lactic acid and clothing fibers. Yeast can be grown in tanks, known as fermentors, anywhere; this is one reason why the Bioeconomy is such an attractive opportunity for the middle regions of our country.

At Inscripta, we have designed and built an instrument that scientists use to engineer microbes in their laboratories with the goal of creating desired or beneficial outcomes. For example, we've demonstrated the ability to generate a 14,000-fold increase in the production of lysine, a $3.6 billion globally traded essential amino acid used in applications ranging from nutrition to pharmaceuticals. Imagine the economic impact of discovering efficiencies at this scale across other industrial processes.

We are working with world-renowned scientists to conduct foundational research into antibiotic resistance at a scale that was previously infeasible, with the idea of developing a new generation of antibiotics to fight the most harmful pathogens and emerging threats. We are only seeing the tip of the iceberg on the possibilities to use this technology for good.

We believe our platform will be one of the primary tools enabling the Bioeconomy. It will allow scientists to conduct advanced research and design sustainable new products in a manner that is efficient, safe, and cost-effective, and at a price well within the reach of startup companies, multinational corporations, and academic researchers at universities across our country.

We talk at Inscripta about democratizing access to genome engineering – it is one of our guiding principles. This means making sure it can happen anywhere, in a responsible and safeguarded way, with no scientist or part of the country left out.

But as access to genomic engineering technology accelerates, it's crucial to recognize that the same opportunity available across our country will also present itself – and in fact already has – outside our borders, in countries such as China. My industry colleagues and I are here today because we want to see the U.S. lead in this Bioeconomy revolution, just as we did in the Internet revolution, and to set the standards for scientific integrity and biosecurity that will be crucial as genome engineering scales globally. We also believe and are encouraged by the fact that this is a nonpartisan issue and one that can unify us as a nation.

The Bioeconomy will be the prime driver for the next wave of growth in manufacturing in the U.S. as well as being a catalyst for new job creation. It will create our next industrial revolution, which will be a bio-industrial revolution. And

that revolution – in economic growth and job growth – will happen across our country, not just along our coasts because the tools will be ubiquitous.

The legislation before you addresses actions our government can take to assist the private sector and academic institutions as we develop our Bioeconomy. This includes ensuring that our learning institutions are equipped to produce the workforce of the future. It means removing unnecessary regulations that could impede it. It means ensuring protection for intellectual property. And it means leading in establishing global standards.

A recent report from the National Academies of Sciences, Engineering, and Medicine states that in 2016, the bioeconomy accounted for about 5.1 percent of U.S. gross domestic product (GDP). In dollar terms, this represents $959.2 billion. As biological engineering becomes more sophisticated and capable, it will have an increasingly broad impact on the economy. However, China is outspending us, and they are producing many more graduates than we are. Just as we led the last industrial and tech revolutions, it is vital to the national security that we don't fall behind other countries on building a Bioeconomy, either.

Thank you very much. I'm happy to answer your questions.