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Synthetic Biology: The Opportunity for the UK to be a Leader in Synbio for Human Health.

Synthetic biology (synbio) will provide the next generation of advanced cures and therapies. This evening, in collaboration with bit.bio, we heard from four experts about this exciting field and how the UK can be a synbio pioneer. Fiona Mischel, Director of International Outreach at SynBioBeta, discussed synbio's potential across multiple industries, from medicine to food production. Dr Sara Holland, Patent Attorney at Potter Clarkson, explained how we can better utilise collaborations between academia and industry in the UK. Dr Joe Healey, Co-founder and CEO of NanoSyrinx, outlined NanoSyrinx's work and the obstacles synbio companies face. Lastly, Dr Mark Kotter, Founder and CEO of bit.bio, introduced bit.bio's work and how it hopes to address issues faced by the biological sciences. We had a varied Q&A session, mostly focusing on how government can make it easier for innovative synbio work to thrive in the UK.

Synbio has the potential to impact many industries across the economy. The McKinsey Global Institute expects synbio to become a \$2-\$4 Trillion industry over the next 10-20 years. Ms Mischel also outlined how synbio is projected to address 45% of the world's disease burden. Synbio has already started impacting food production internationally, with Singapore being the first country to approve the sale of cultivated meat. However, Ms Mischel cautioned that the conservative attitude of investors in the UK compared to competitors like the US makes the UK pose a serious obstacle to synbio sector's ability to innovate here.

A fruitful relationship between academia and industry will be needed if the UK wishes to lead in this area. Dr Holland outlined many of the current issues with this collaboration in the UK. A central issue is the pressure on universities to publish their innovative work, instead of developing commercial enterprises out of the research. Companies which

spin-out of universities represent only a small fraction of the innovative work carried out in these institutions, meaning the majority of such work remains commercially dead, creating no jobs. Incentivising universities to move away from this model will be crucial.

Dr Healey gave us a first-hand account of the obstacles start-ups in this field face. NanoSyrinx was set up in 2020, and works to develop methods of delivering drugs into human cells, with this being a "holy grail" of new therapies. Dr Healey explained how access to UK growth capital is a very real obstacle for start-ups like NanoSyrinx. Since synbio is a collaborative field it runs the risk of being "homeless" within UKRI, since it doesn't easily fit within the current landscape of funding in science.

bit.bio is one company which is innovating in this sector. Central to bit.bio's work is its discovery platform, optiox, which removes the bottlenecks facing the development of cell therapies as the next generation of medicines. Dr Kotter outlined how synbio has the potential to fix the reproducibility issue in the sector. A study of publications in Bayer discussing potential drug targets found that only 21% of results were reproducible. This results in a waste of time and resources. Synbio's mixing of engineering with biology, such as the work done at bit.bio, could help alleviate this structural issue, allowing for greater innovation.

Overall, the UK is potentially in a good position to be a world leader in synbio. However, the structural issues around funding and innovation must be addressed if we hope to keep up with international competitors.

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*P&SC Discussion Meeting, 'Synthetic Biology'
21st February 2023*