Successful scale-up leads to new investments

Impact Event – February 2018

Oxford Biotrans Limited
Commercialising new routes to high value chemicals using our patented enzyme technology

- A library of proprietary cytochrome P450 enzymes
  - P450s are enzymes that catalyse oxidation of carbon-hydrogen bonds -> difficult to achieve with conventional chemistry
  - Our enzymes have high selectivity and activity with proven broad substrate applicability
- Core knowhow in design and use of bespoke P450 enzymes for specific transformations
- Patents covering the enzymes and their use
- Simple enzymatic processes with high selectivity, low-cost feedstocks, low energy-intensity
  - Low cost of production
- No high-energy compounds such as peroxides; no heavy metal or toxic wastes
  - Green, environmentally friendly, sustainable sources, consumer acceptance

Core intellectual assets create an engine for new process innovation
Initial focus: High value flavours and fragrances (F&F)

- Biotransformation of valencene to **nootkatone**, the flavour and scent of grapefruit

| Current production from grapefruit costly underpinning high market price for natural-grade nootkatone. | Because our nootkatone is produced from a natural raw material using an enzyme it will be designated ‘natural’ = **pricing premium driven by consumer demand** |
| Several factors leading to instability of supply and annual shortfall in availability of natural-grade nootkatone product | We produce from valencene, which has relatively stable pricing and availability from orange oil = **security of supply** |

Pipeline of additional F&F products being progressed
September 2013 Oxford Biotrans spun out - Seed funding £0.7M

- Worked with CPI and other CRO’s around the UK on initial process development
  1. P450 Enzyme Production by Fermentation
  2. Biotransformation of valencene using P450 Enzyme

- Successful demonstrations led to £2.5M Series A funding round in July 2015
Building up our team

- **Multi-disciplinary** team of 13 built since July 2015
- Labs at Milton Park **equipped and operational** since Jan 2016
- Discovery work on **next products** in pipeline
Partnership with Bio Base Europe: Scale-up

- Biotransformation scale-up started in September 2015
- Technology transfer: initial bench scale runs
- Translation to small pilot reactor and then on to larger and larger vessels
- Numerous innovations in upstream and downstream processing have been introduced as part of this scale-up partnership

Valencene → Nootkatone
Partnership with Bio Base Europe: Outcomes

• Working with BBEPP expedited translation from proof-of-concept to commercialisation
  • Facilities
  • Resources
  • Knowhow
  • Flexibility

➢ First production of natural-labelled, food-grade nootkatone at commercial scale achieved in July 2017

➢ Led to £2.1M funding round in September 2017
Going to market

• Now moving to **routine production** at even larger scale

• **Marketing and distribution** agreement signed with De Monchy Aromatics, a global F&F company

• Product already introduced to market with **positive feedback on taste and purity**

• Quoting for supply, **sales imminent**
Summary and next steps

- Patented enzyme technology and growing in-house know-how in process development and scale-up
  - “Engine” for new process innovation

- First process for production of nooktatone demonstrated at commercial scale

- Nootkatone sales expected in 2018

- Pipeline of additional F&F products being progressed

- Pursue commercialisation of our pipeline of products
  - Opportunities in agrochemicals, colourants, nutraceuticals, pharma etc.

- Progressively improve the efficiency and economics of our processes
  - Increases profitability
  - Expands addressable market

- Position the company for a further acceleration in growth rate
  - Potential future investment in additional resources to pursue aggressive monetisation of expanded business potential