



A gut feeling: the current gap

**Pulses for Healthy Guts
(and healthy environment) Workshop
March 2021**

**Paul Dupree
Dept of Biochemistry
University of Cambridge**

**pd101@cam.ac.uk
@dupreelab**



Drivers of innovation in food

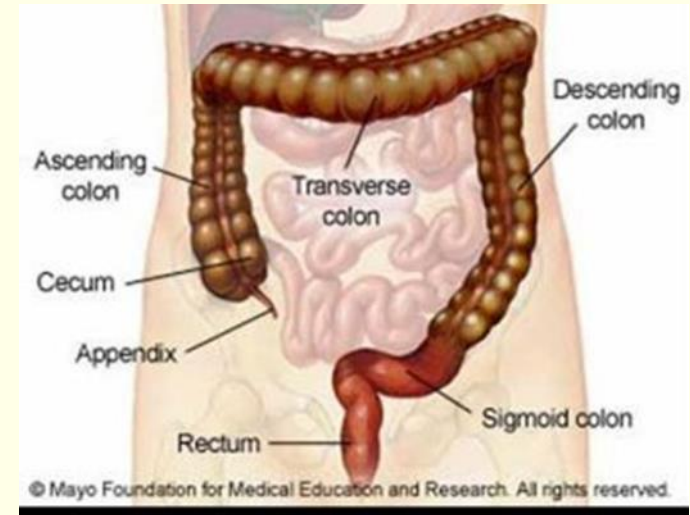
- Responses to climate change, biodiversity loss.
 - Energy input and green house gas emissions for agriculture is substantial.
 - The major land use in agriculture is for meat production - pasture, animal feed.
- Increase in demand for vegan, vegetarian foods and plant protein.
- Successful innovation in food sector – technologies for meat replacements, wider ranges of products.



Photograph: João Laet/The Guardian

Health drivers of innovation in food

- Gut microbiome is an important 'human organ'.
- Microbiome health influences many aspects of disease, drug therapeutic success, mental health.
- Food influences the gut microbiome health, diversity and composition in complex ways.
- Obesity and diabetes 'epidemic' worsened by poor food quality and poor availability of cheap healthy foods. Linked to gut microbiome



Opportunities with Pulses

- Legume plants (pulses) fix nitrogen, reducing energy and fertiliser inputs.
- Pulses high in protein.
- Plant protein production has less impact than animal protein
- Now recognised and pulse cultivation and consumption are promoted
 - Legvalue EU network
 - TRUE EU network (coordinated in Scotland)
 - Pulse Crop Genetic Improvement Network (NIAB, JIC, PGRO and others)



Diabetes.co.uk

A gut feeling: the current gap

- OPPORTUNITY: develop and promote legume-based foods with the most beneficial fibre contents for health.
- Pulses are generally high in fibre
- Both water soluble and insoluble fibres are present in pulses
 - What are the beneficial effects of pulse fibres?
 - Which pulse fibres are most beneficial to the gut microbiome?
 - How do fibres vary between pulses (lentils/beans/peas/landraces?)
 - How are the beneficial fibres affected by processing in food manufacture?



Diabetes.co.uk

A gut feeling: local opportunities

- Cambridge has very broad research and innovation expertise
- Large plant science research base (Plant sciences, Biochemistry, Sainsbury Lab, Crop Science Centre, NIAB)
- Manufacturing innovation (IFM), consumer choice research
- Medical research related to the microbiome (genomics EBI/Sanger, Pharmacology, MRC toxicology, biomedical campus, vet school)
- Vibrant local biomedical, food and agriculture industry and innovation in East of England



Diabetes.co.uk

Improving health with diversity of good fibre.

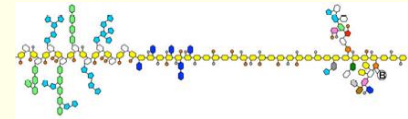
- Wide range of expertise in today's workshop - Cambridge, East of England, National, International.
- Establish links of mutual interest prior to future grant funding opportunities.
- Meet and connect through group discussions, Jamboard.
- Generate collaborations.
- Pump prime funding available for projects.

Pulses



Diabetes.co.uk

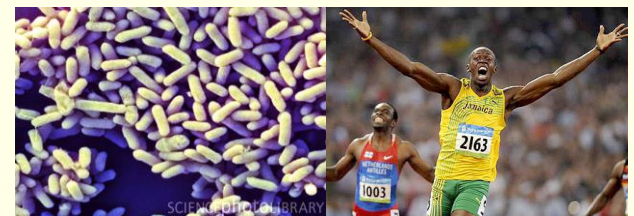
Fibre



Food



Health



Dietary Fibre: Complex carbohydrates

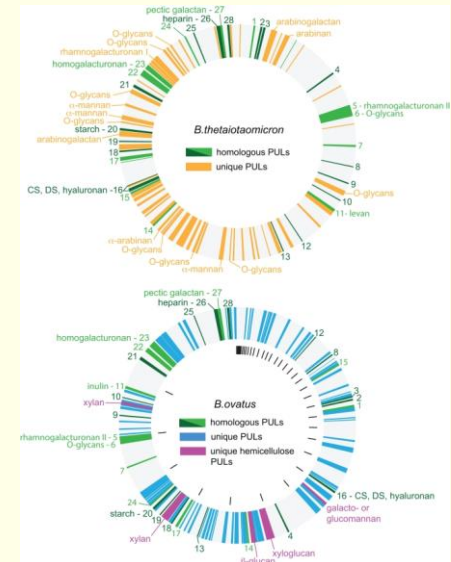
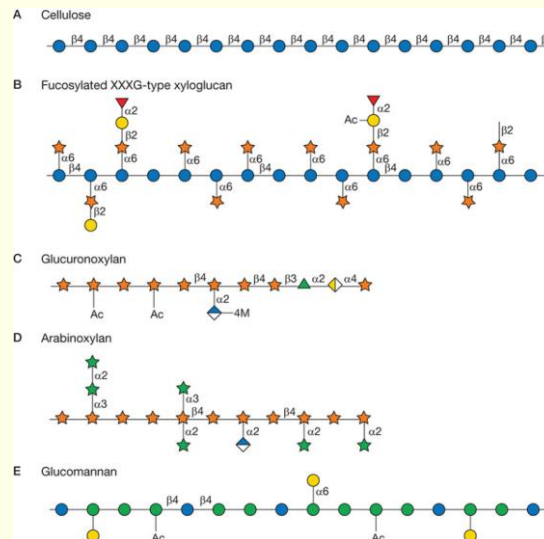
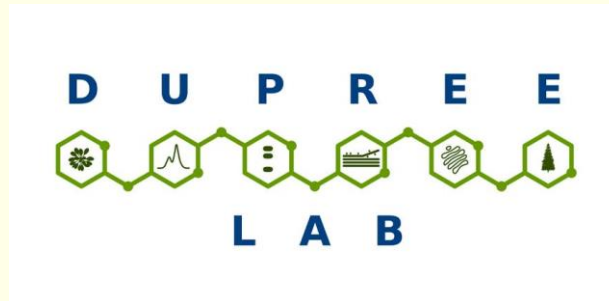
- Discovering diversity in plant complex carbohydrates
- Genetics of plant carbohydrate biosynthesis
- Discovering mechanisms of carbohydrate breakdown by microbes



Diabetes.co.uk



credit Wikipedia



Martens et al. PLoS Biol. 2011 Dec; 9(12): e1001221