



# Team Newcastle University 2009



# BAEMAN





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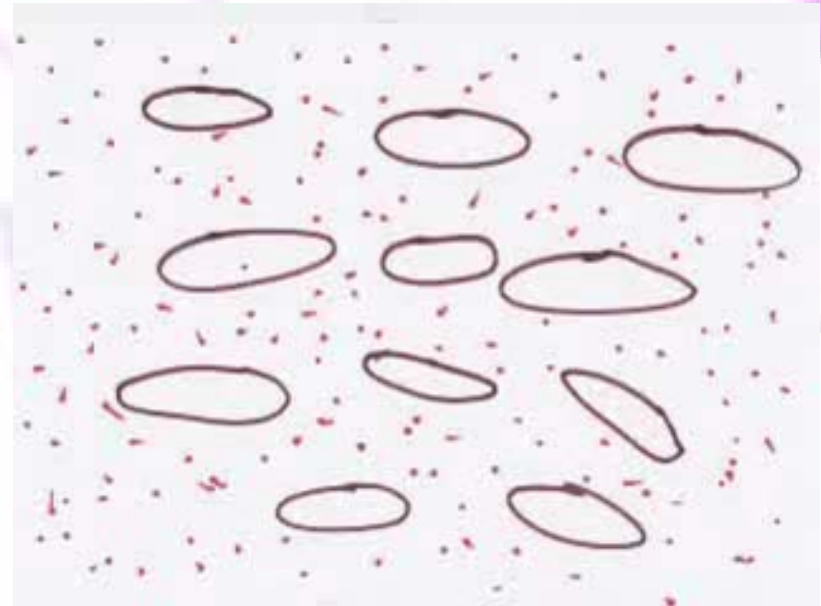
# Cadmium

- A heavy metal that can pollute soils and water sources
- Exposure is associated with renal dysfunction, bone demineralisation, and cancer
- Contaminates agricultural land
  - Zinc mining
  - Production and application of phosphate fertilisers
  - Inappropriate waste disposal (Ni-Cd batteries)
- Exposure is significantly higher in China and Japan than in Europe and the US



# Project Overview

- To sequester cadmium into the spores of *Bacillus subtilis* and to prevent them from germinating again.
- This makes the cadmium bio-unavailable.
- We aim to do this using metal sensors and metal sponges as well as harnessing *Bacillus*' metal importer channels.

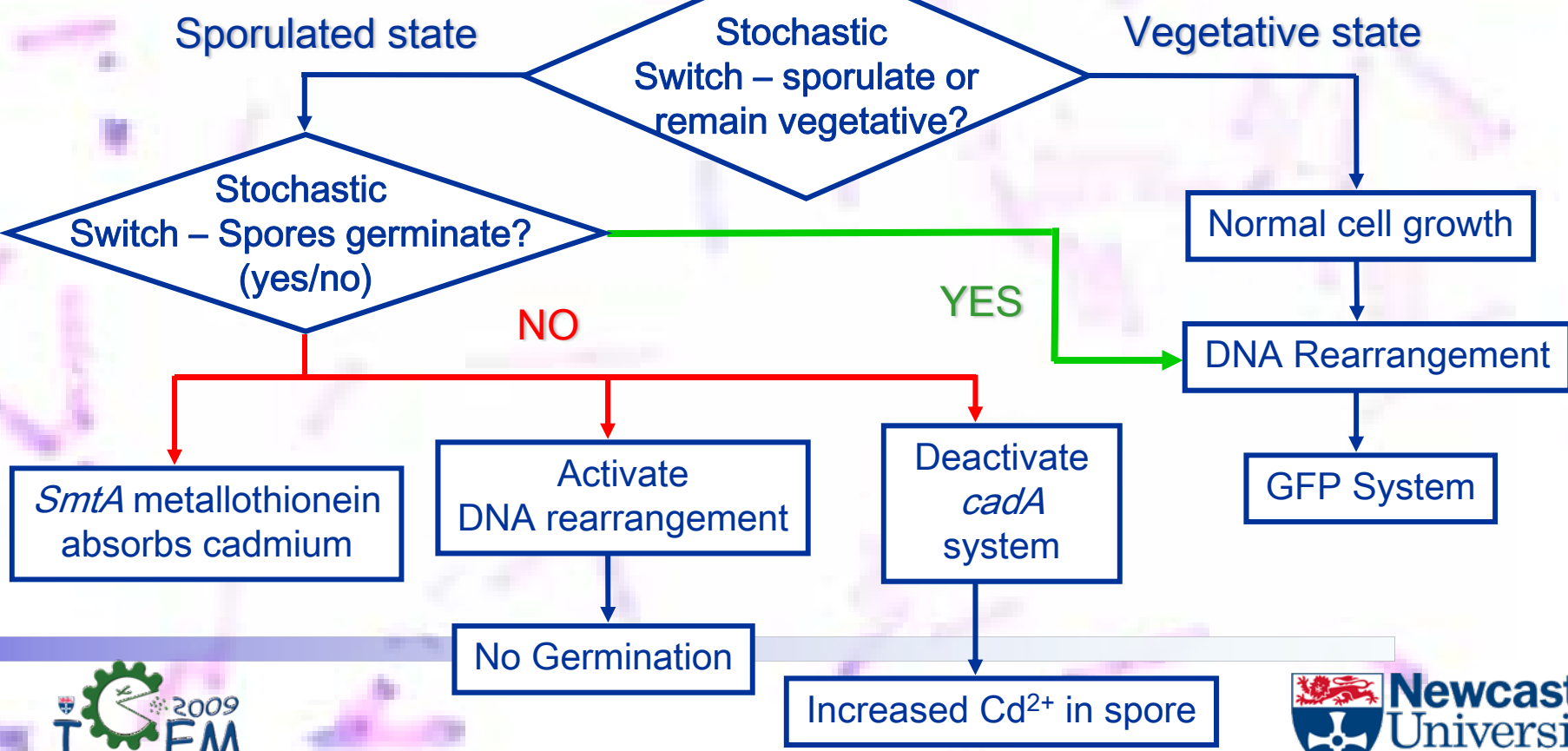


[Video](#)



Cadmium taken into cell (*MntH* pump)

Cadmium sensed by *CzrA* and *ArsR*





# ***Bacillus subtilis***

- ***Why Bacillus subtilis?***

- Expertise on *Bacillus subtilis* at Newcastle University
- A soil-dweller
- Naturally competent
  - Chromosomal integration
- Can sporulate
  - Spores are resilient



# Labwork

**To prove our concept we intend to:**

- Show our bacteria sense cadmium
- Show the cadmium is located to the spore
- Show we can prevent our bacteria from germinating
  - Doesn't interrupt the natural lifecycle



# Computational Modelling

**Systems are modelled to obtain parameters needed, such as:**

- Cadmium Uptake Model
- Stochastic Switch Model
- Population Model

**Technologies planned for use:**

- CellML
- SBML
- Matlab
- Java





# Questions?

