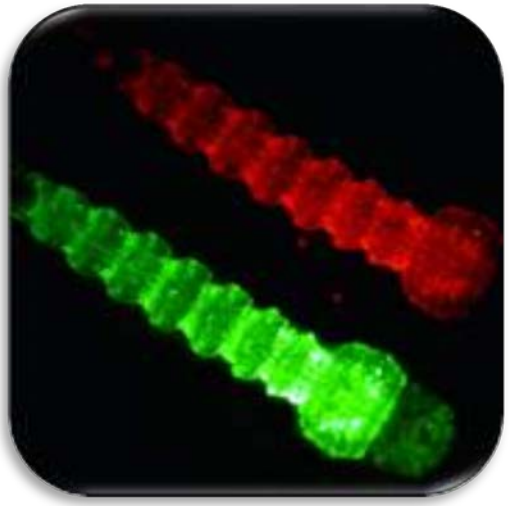
OXITEC

Oxitec Insect Control for public health and agriculture

ABIM 2014 (20-22 Oct 2014)

Camilla Beech

Oxitec insect control technology



Combat insect-borne diseases

Improve crop yields

through the reduction of pest insect populations

biological approach that is safe, sustainable, economic and applicable to many insect species worldwide

Why engineer insects for pest control ?

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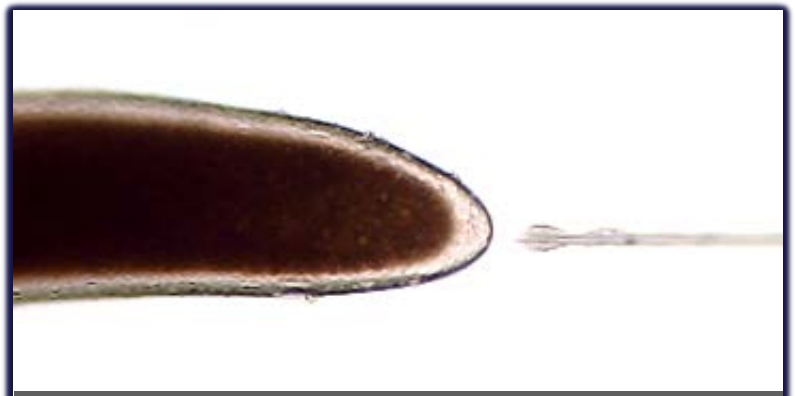
New control solutions needed for public health and agriculture

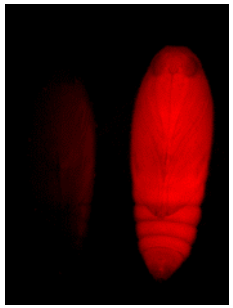
- consumer demand for more food on less land
- demand for residue reduction
- changing pest pressures
- fewer available pesticides
- pesticide resistance

Oxitec introduces two genes



Injecting genes into insect egg

Self Limiting Gene



Fluorescent Marker Gene

Self Limiting Gene

- Repressed with an antidote during male insect production
- Passed on to progeny fathered by Oxitec males
- Prevents offspring from developing into reproductive adults
- Without continued release disappears from the gene pool and environment

Marker Gene

- Fluorescent Protein detected by special light
- Allows track and trace for Oxitec insects
- Allows estimation of pest population sizes
- Allows effective monitoring of pest population suppression

Our approach

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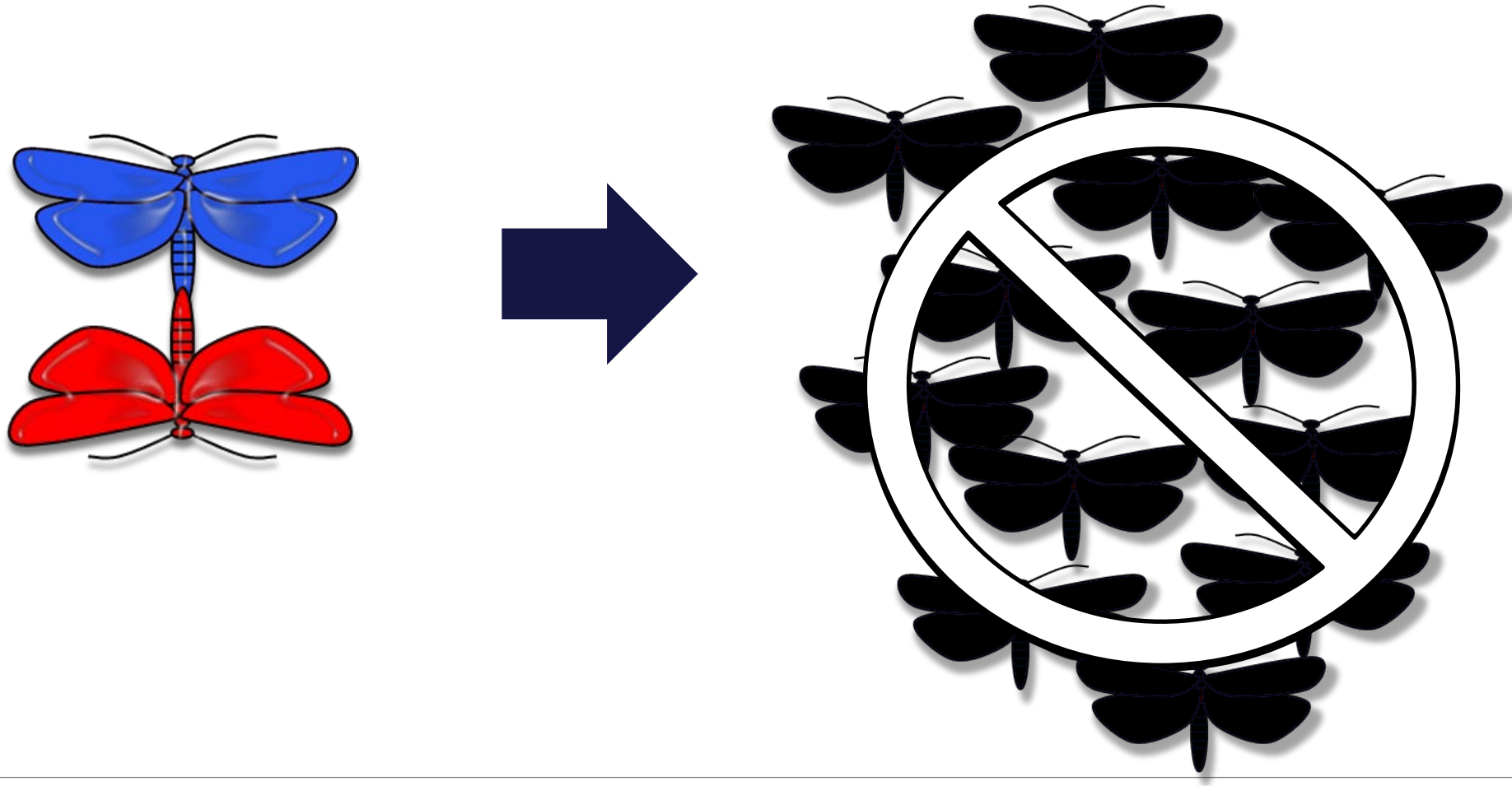
Oxitec technology disrupts the reproductive cycle of pest insects



Oxitec self limiting technology

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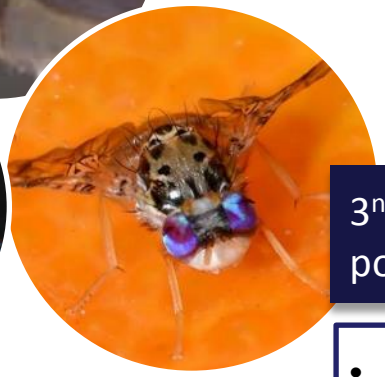
Oxitec technology is species specific

- No effects on beneficial insects like bees
- Compatible with Crop Protection technology

1st Generation population control

- Physical sorting males
- Effects male and female offspring, which fail to reach adulthood



2nd Generation Male selection

- Genetic sorting to give males
- Effects only female offspring which fail to reach maturity

3nd Generation early population control

- Genetic sorting to give males
- Effects both males and female

Oxitec portfolio

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Agriculture

Target		Crop
	Medfly	Citrus/pome/ stone fruit
	Olive fly	Olive
	Diamondback moth	Brassica
	Pink bollworm	Cotton
	Silkworm	Silk

Public Health

Target		Vector of
	*Aedes aegypti*	Dengue
	*Aedes albopictus*	Chikungunya & dengue
	*Anopheles stephensi*	Malaria

In development

Target		Crops
	*Drosophila suzukii*	Soft fruit
	Red flour beetle	Stored products

Effectiveness

Aedes aegypti **field trials show greater than 90% mosquito suppression**

Cayman Islands
96%
300 people

Pedra Branca
92%
50,000 people

Itaberaba
94%
2,000 people

Mandacaru
99%
3,000 people

Key benefits summary

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Efficacy

- Reduces insect pest population below disease or economic threshold
- Highly targeted - uses the biological imperative of a male to seek out females

Control

- Released insects and their progeny die in a few days – providing a self-limiting or ‘dead end’ strategy
- Simple monitoring using fluorescent protein – provides ‘track and trace’ and predictive capability

Environment

- Reduce or more effective insecticide use – ideal in IPM programmes
- Species-specific – no impact on beneficial insects
- Does not persist in the environment or crop
- ‘Environmentally preferable’ approach – USDA

The challenge:

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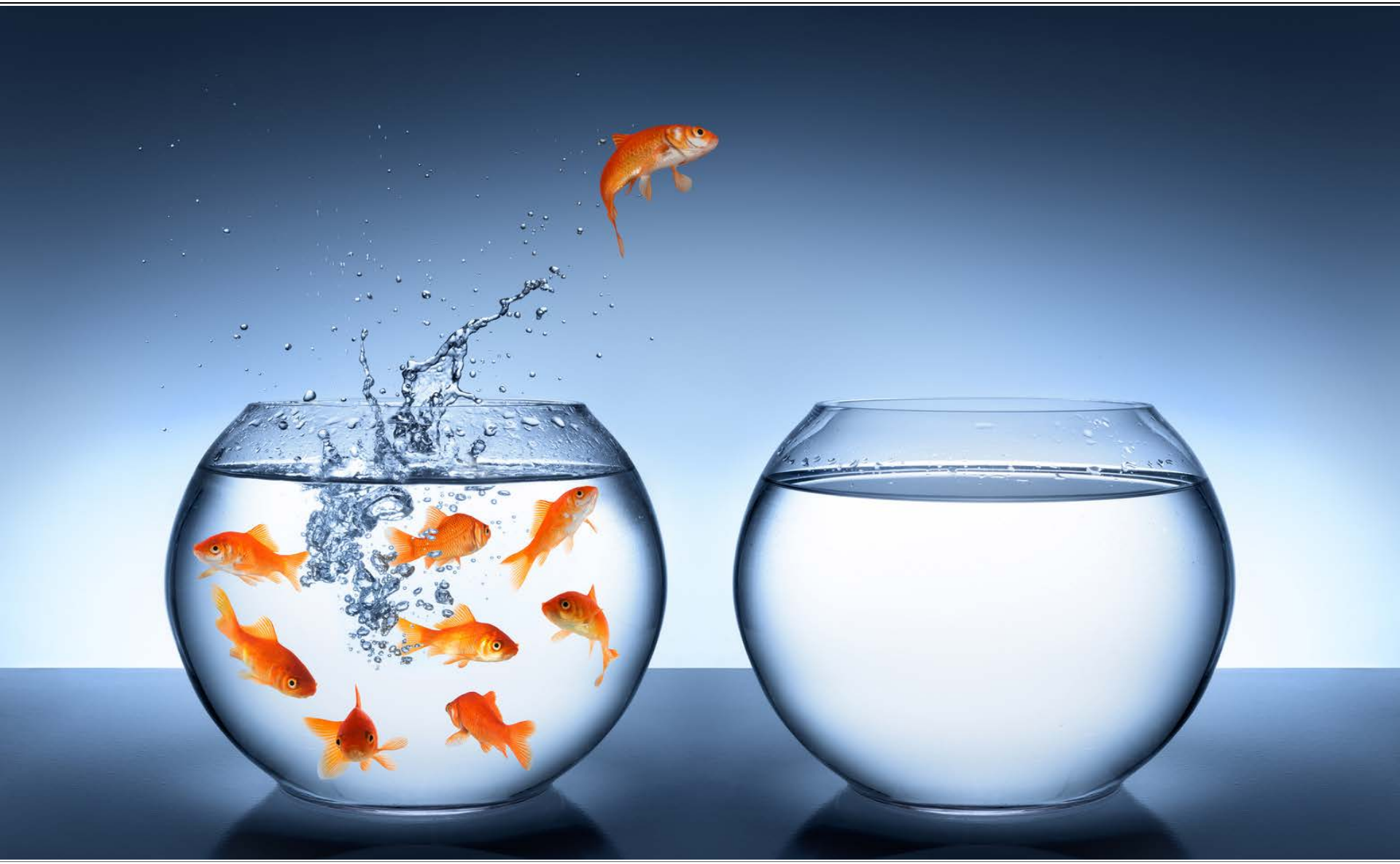

Regulatory approach

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Disruptive innovation

- Often no clear regulatory pathway
- Currently using a mix of GM legislation (EU, Brazil) and product legislation (USA)
- GM legislation (safety) followed by product legislation (label)
- May hinder progress and use

Proportionate pragmatic regulation

- Risk – benefit analysis key to decision making
- Ideally a “ product “ registration including safety
- Biological control may be a precedent?

Regulatory progress

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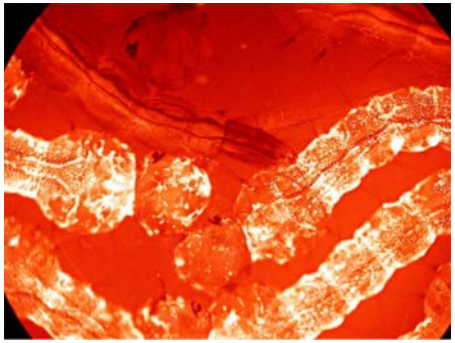
All applications successful across all Oxitec GM insects
" Environmentally preferable"



comissão técnica nacional
CTNBio
de biossegurança

Oxitec *Aedes aegypti* received approval for commercial releases in Brazil April 2014

Import and contained trials approved

- Austria
- France
- Greece
- Guatemala
- Israel
- Singapore
- Thailand
- Vietnam
- UK

Current applications for outdoor release

- India
- Spain
- Caribbean

Outdoor release approved

- Brazil
- Cayman
- Malaysia
- Mexico
- USA
- Panama

Acknowledgements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USDA

PAT
Projeto Aedes Transgênico


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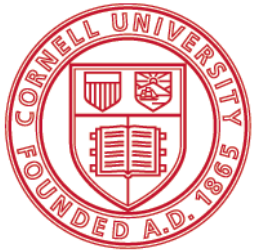
Líderes de la investigación, comprometidos con la solución de los problemas de la salud


Cornell University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BBSRC INNOVATOR OF THE YEAR 2009
WORLD ECONOMIC FORUM


Technology Pioneer 2008

Grand Challenges in Global Health


World Health Organization

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