Manaaki Whenua
Landcare Research

Using traps for managing rodents

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Manaaki Whenua-Landcare Research

New Zealand context

- Ship rat
- Norway rat
- Polynesian rat (kiore)
- House mouse

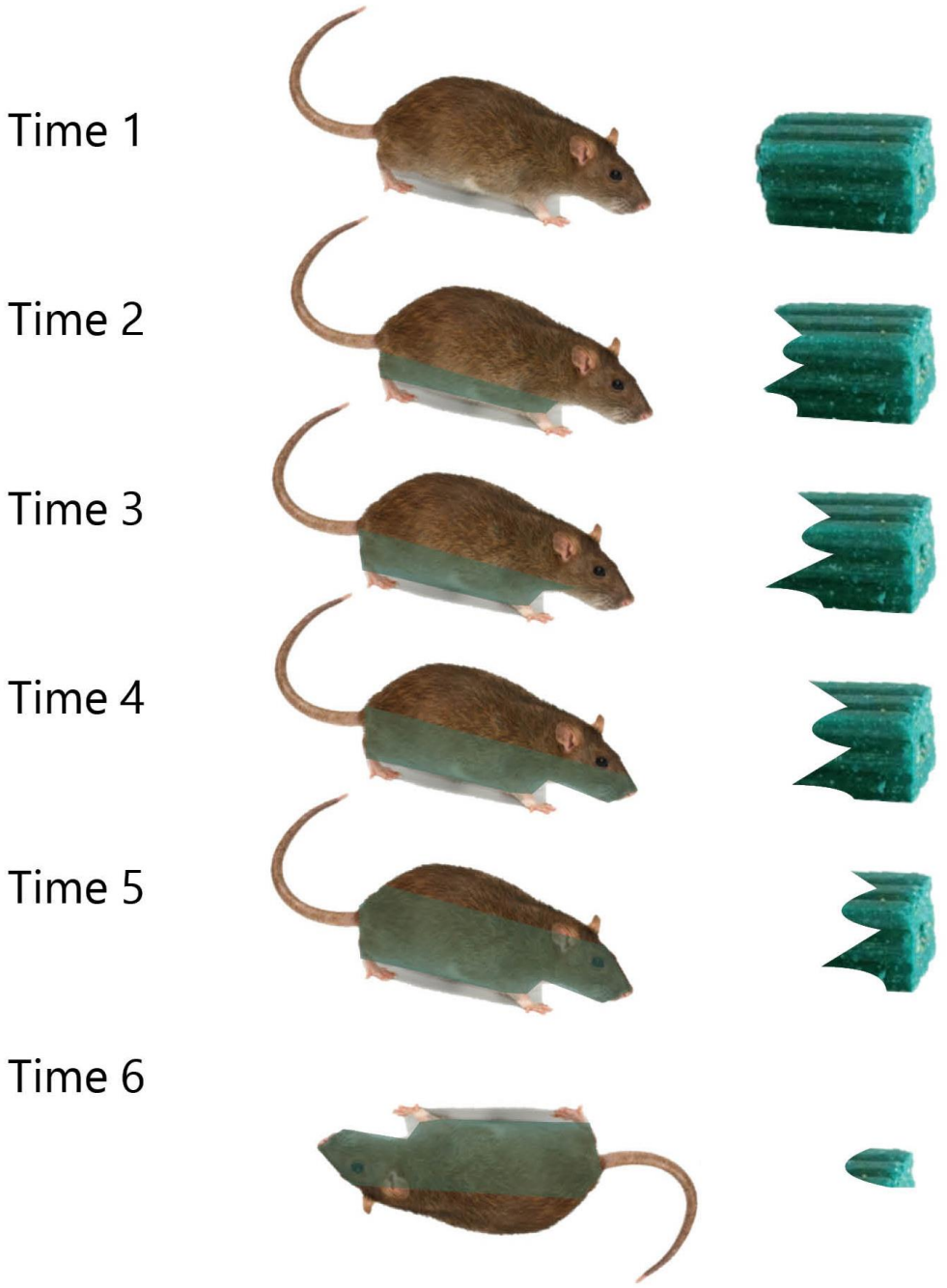
Managed primarily as conservation pests

Commensal rodents also controlled

Why anticoagulants?

Omnivore's dilemma

- Eat a wide variety of foods
- Novel foods eaten cautiously
- Requires slow acting toxins to ensure rodents eat a lethal dose



Demand for rodent Traps

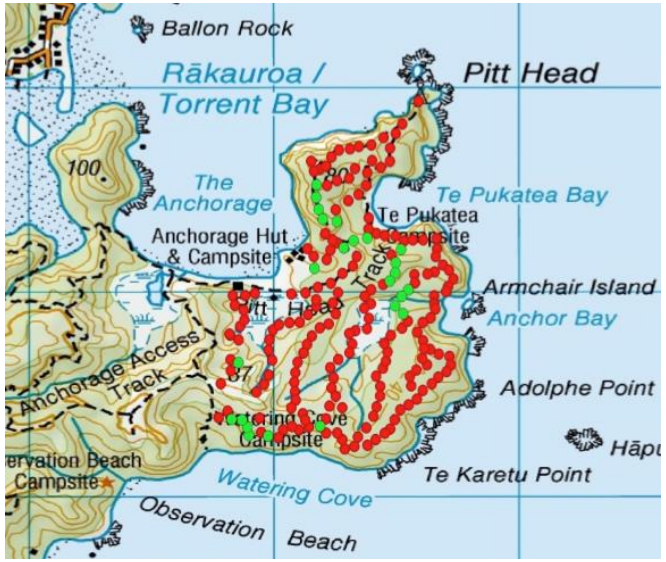
- Predator-free 2050
  - Rats
  - Possums
  - Stoats

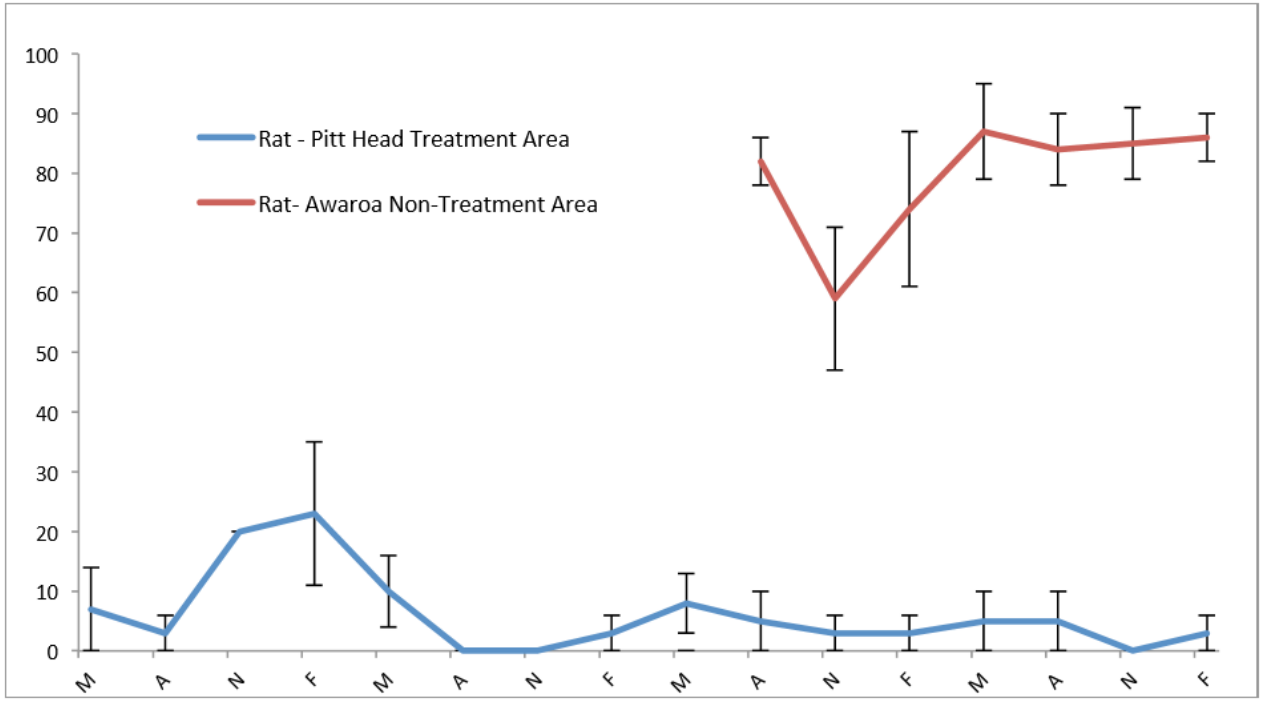
- Many community conservation groups

- Prefer to use traps

Controlling ship rats with the GoodNature A24

CO_2 powered multiple-capture trap

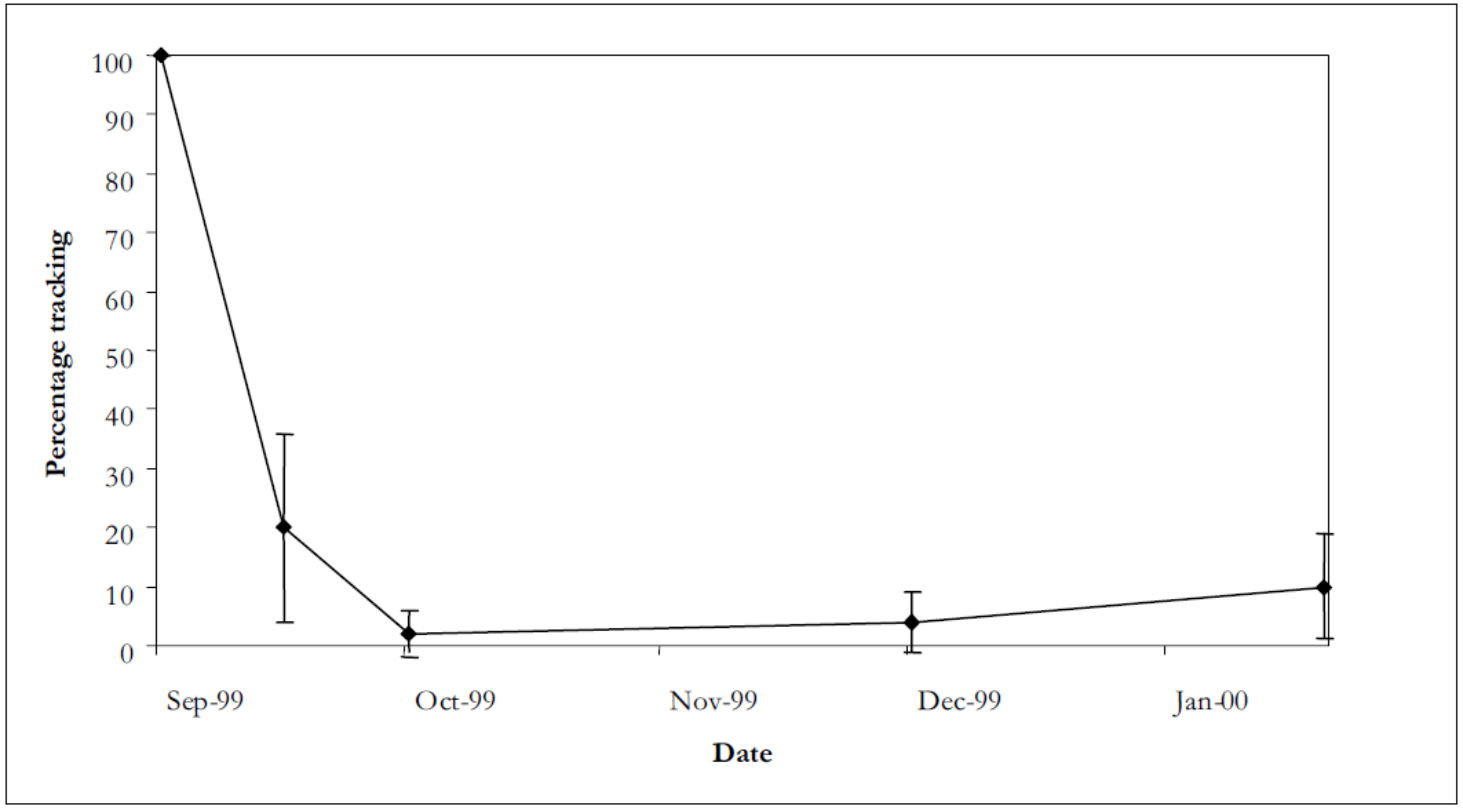




Ship rat control

- 200ha forest area
- Victor professional traps

FIGURE 4: WAIKOKOPU CORE AREA (TRAPPING OPERATION)
RAT TRACKING 1999/2000 (95% CONFIDENCE INTERVALS SHOWN).



Burns R, Harrison A, Hudson J, Jones G, Rudolf P, shaw P, Ward C, Wilson D, Wilson L. 2000. Northern Te Urewera ecosystem restoration project. Department of Conservation

Trap development timeline

Incremental improvement

Step-change

1700

1900

2018

2020-25

?

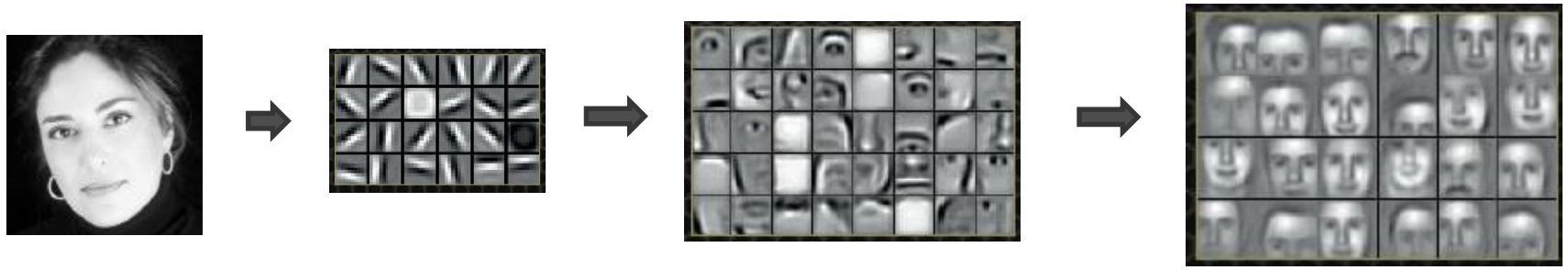
Trap effectiveness

Conditional probabilities

Given a rodent encounters a trap, what is the probability it is captured?

From ‘active’ to ‘passive’ traps

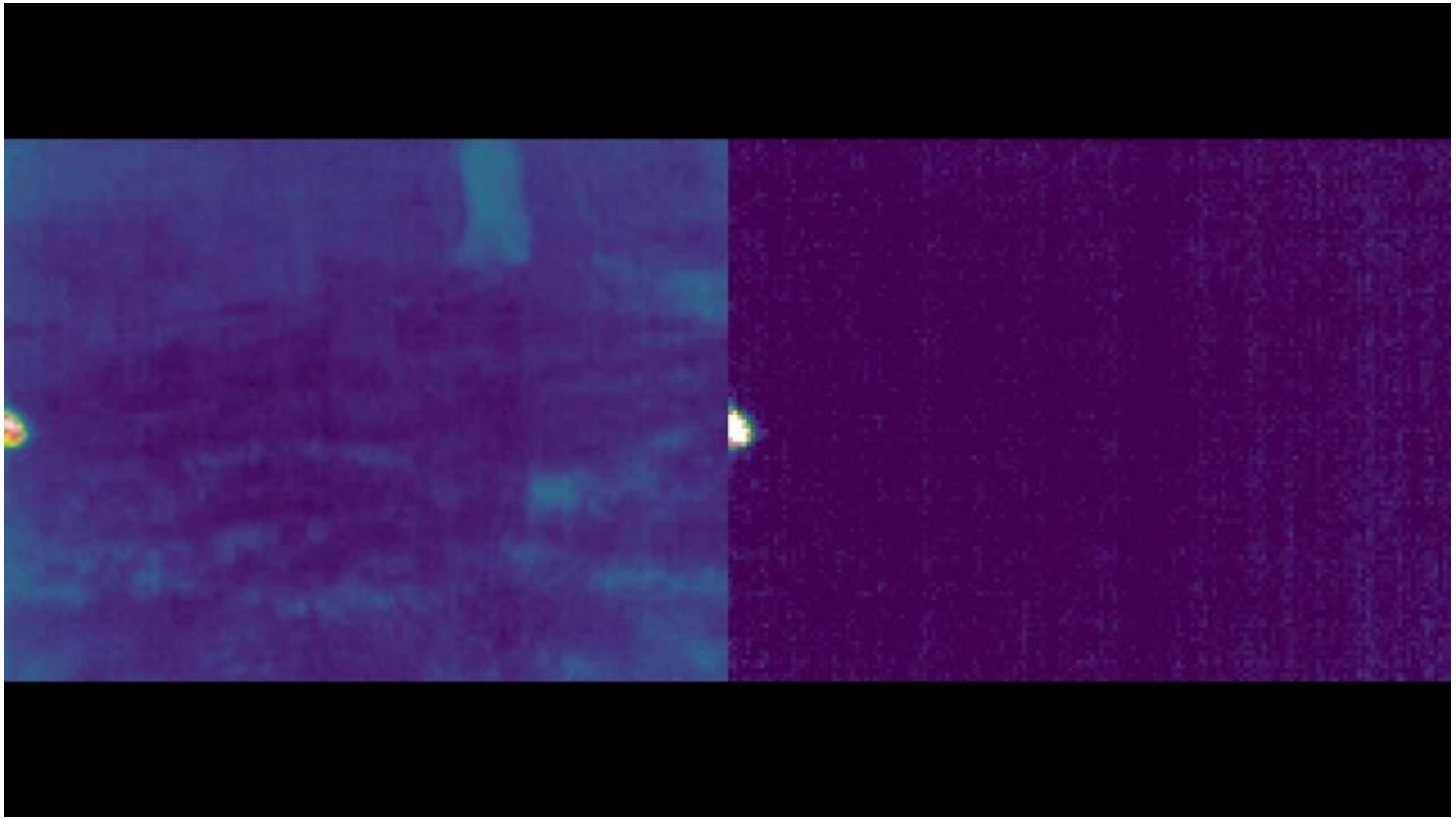
- Application of Artificial Intelligence (AI) to species recognition and trapping.
- Uses convolutional neural networks



- Pest species:

	Possum	Rat	Stoat	Other	Empty
Possum	783	0	0	1	16
Rat	0	785	0	0	15
Stoat	0	0	791	0	9
Other	0	0	0	790	10
Empty	12	5	12	16	755

Figure 16: Confusion matrix of the final solution



Integrating AI and traps

Novel control tools

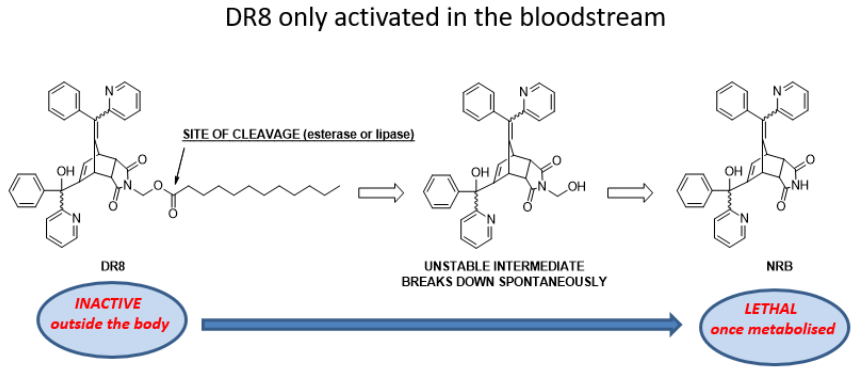
Rattus-specific toxin

Genome mining - Archilles heel

Gene drives

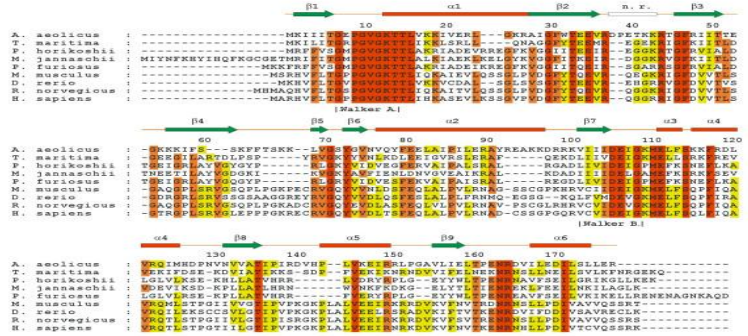
DR8:

- Norbormide prodrug
- Close-to-market

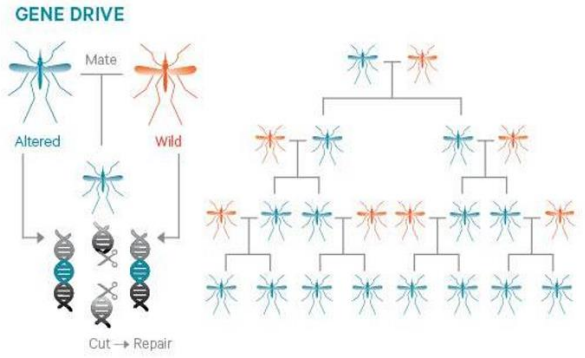


Species-selective toxins

- Pest-specific receptors suitable for toxin design



Using CRISPR gene editing to create a gene drive to suppress fertility (e.g. only male offspring) (GBIRd)



Thank You

Nga Manu images