

Environmental Genetic Engineering by RNAi and Genome Editing



[Directions](#) [Ingredients](#) [Clinical Studies](#)

Photolysomes. The liposome encapsulated DNA repair enzyme, photolyase derived from plankton, is hyper-efficient and unique in its ability to reduce the visible signs of UV-induced insults.

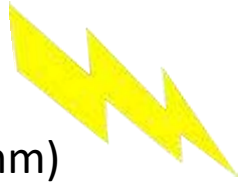
Endosomes. A liposome encapsulated extract from the marine microbe, *Micrococcus Lysate*. Extremely UV resistant, the extract contains the enzyme UV-endonuclease which improves the appearance of sun damaged skin.

Mitosomes. A liposome encapsulated repair enzyme, Arabidopsis Thaliana, aids in the removal of the signs of oxidative damage.

Jack Heinemann
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School of Biological Sciences

UV endonuclease and photolyase

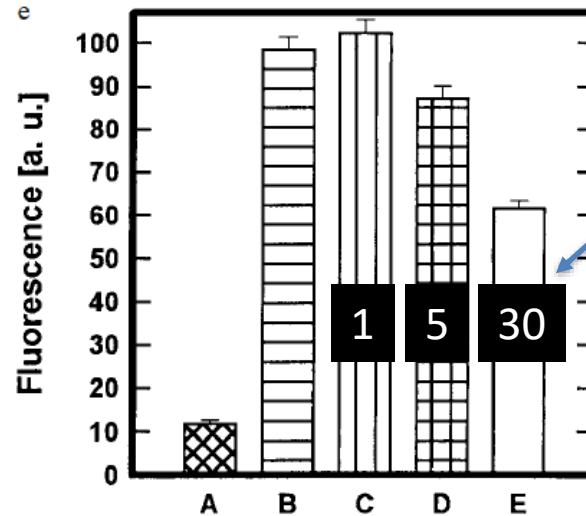
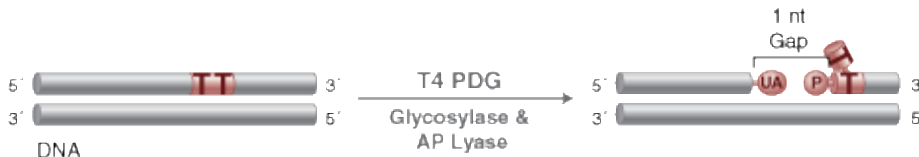
UVB
(290-320 nm)



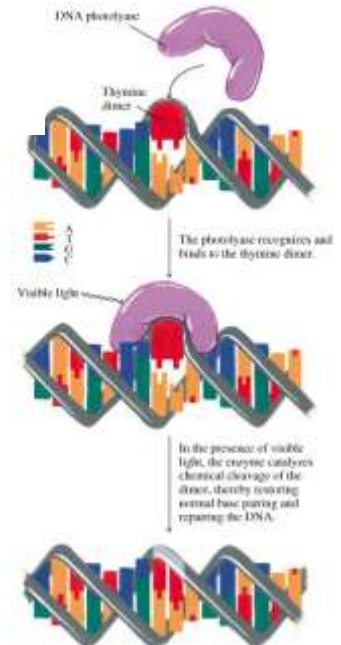
human buttocks



large, recurrent exposures



time post photoreactivation



Based on...



Environment International

Available online 4 June 2019, 104856

In Press, Corrected Proof



(1)

Review article

Should dsRNA treatments applied in outdoor environments be regulated?

Jack A. Heinemann

Show more

<https://doi.org/10.1016/j.envint.2019.05.050>

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(2)

Environmentally Applied Nucleic Acids and Proteins for Purposes of Engineering Changes to Genes and Other Genetic Material

Article reference	BSHEAL15
Journal	Biosafety and Health
Corresponding author	Jack A. Heinemann
First author	Jack A. Heinemann
Received at Editorial Office	4 Jul 2019
Article revised	29 Aug 2019
Article accepted for publication	18 Sep 2019



ISSN 2590-0536

Active ingredients

A

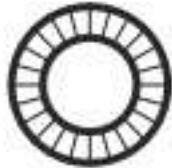
Nucleic acids



dsRNA



dsDNA



ssRNA



ssDNA



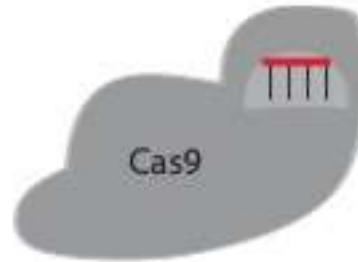
chimera



chemically
modified
nucleotides

B

Proteins/nucleic acids

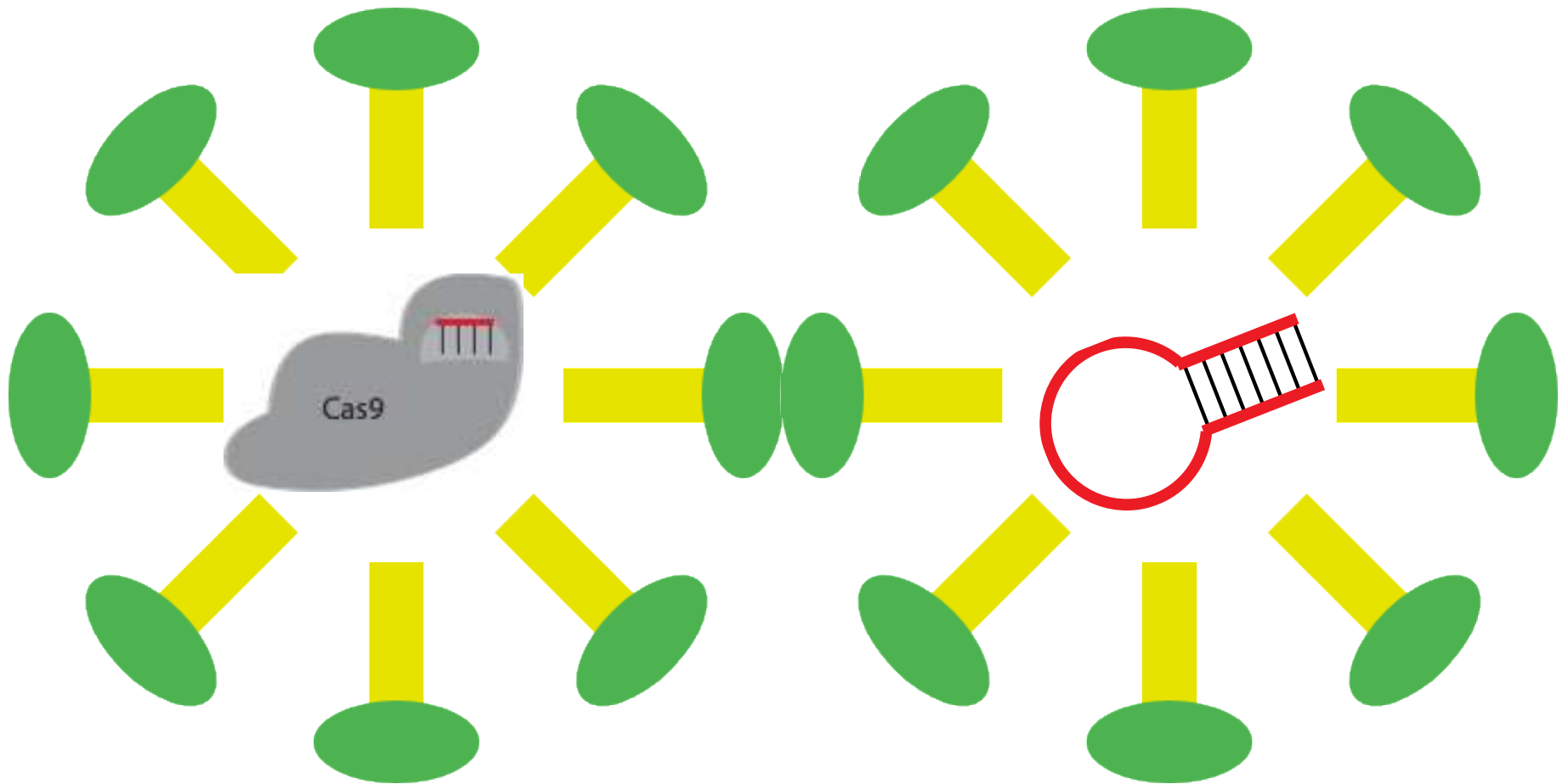


TALENs



“Delivery of Cas9:sgRNA complexes resulted in genome modification efficiencies as high as 80%” in human cells. Patent No.: US 9,526,784 B2

Molecular cargo



Penetrating agents

HARMFUL
KEEP OUT OF REACH OF CHILDREN
ECOTOXIC

Organo Silicone

AGPRO

For use with AGPRO Glyphosates and AGPRO Meturon
Enhance penetration & uptake. Reduces the rain-free period.
READ THE DIRECTIONS FOR USE BEFORE USING THIS PRODUCT

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Batch number # Net Contents: 20Litres

PUBLIC NOTICES

N.Z. FOREST MANAGERS

AERIAL SPRAYING OPERATION

Starting on the 22nd of January 2018 and lasting approximately 3 months, NZFM will be aerial spraying blocks within Lake Taupo, Rotoaira, Kaimanawa, Wainui, Tirohanga and Whareto Forests to control weed growth.

The chemicals used will be Glyphosate, Metsulfuron, Clopyralid, Trichloram and Organosilicone.

Spraying by helicopter will start at first light and last until approximately midday on days when weather conditions allow.

If you have any further queries please contact:
Shane Christie Ph (07)386 8757



dsRNA delivery technologies: commercial

BioDirect™ is Based on New Applications of RNAi Technology

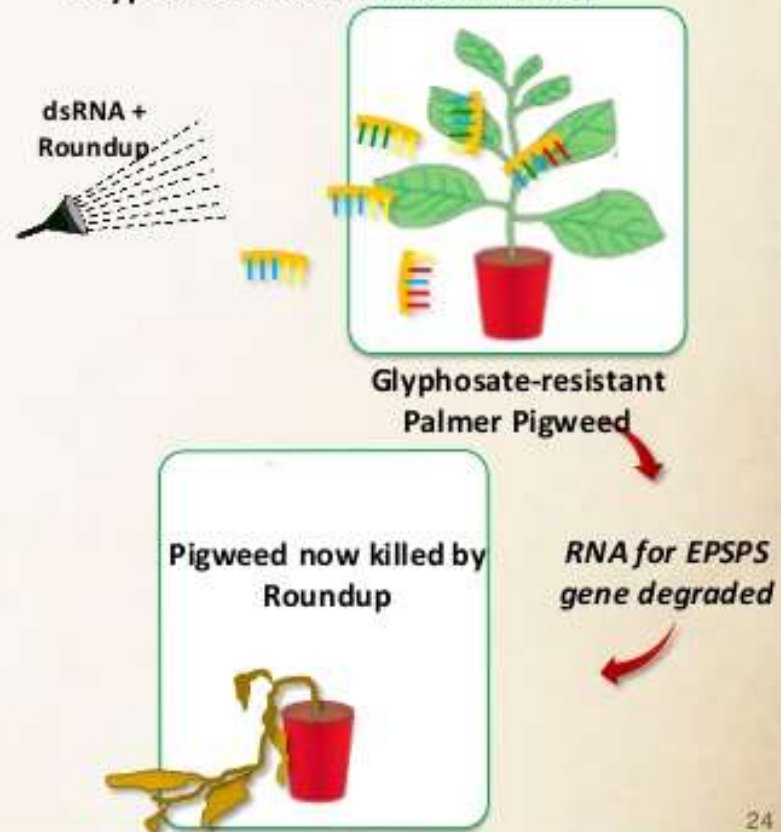


GR-Palmer Uninjured After Treatment With WeatherMAX®



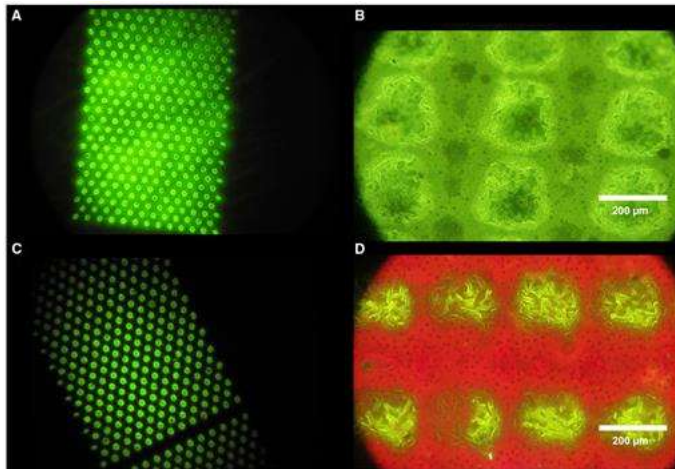
GR-Palmer Controlled By Combining WeatherMAX® With EPSPS dsRNA

BioDirect™ Originated from the Study of Glyphosate Resistance in Weeds



Delivery at industrial scales

laser perforation



[Etxeberria et al. Applications in Plant Sciences, 4\(1\): \(2016\). <https://doi.org/10.3732/apps.1500106>](#)



organisms per m³ air: 100,000's



organisms per gram soil: 10,000-830,000
species

Summary

New genetic engineering not like old genetic engineering. The key difference:

- old genetic engineering commercialises the **product**
- environmental genetic engineering commercialises the **process**
- **exposures uncontrolled:** contact, inhalation or ingestion exposures in ANY organism and simultaneously in ALL organisms in an environment
- **potential repurposing of products**

Acknowledgements

Thanks to:

Sophie Walker

Defence Technology Agency New Zealand

Funding for this research

University of Canterbury