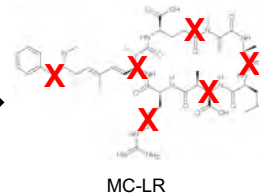


Using Lake Erie Bacteria to Degrade Microcystin



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China Daily
July 23, 2013

Algae's lake effect reveals putrid, pea green disaster



Toledo Blade
August 4, 2014



The Cleveland
July 27, 2011



NPR
August 29, 2016

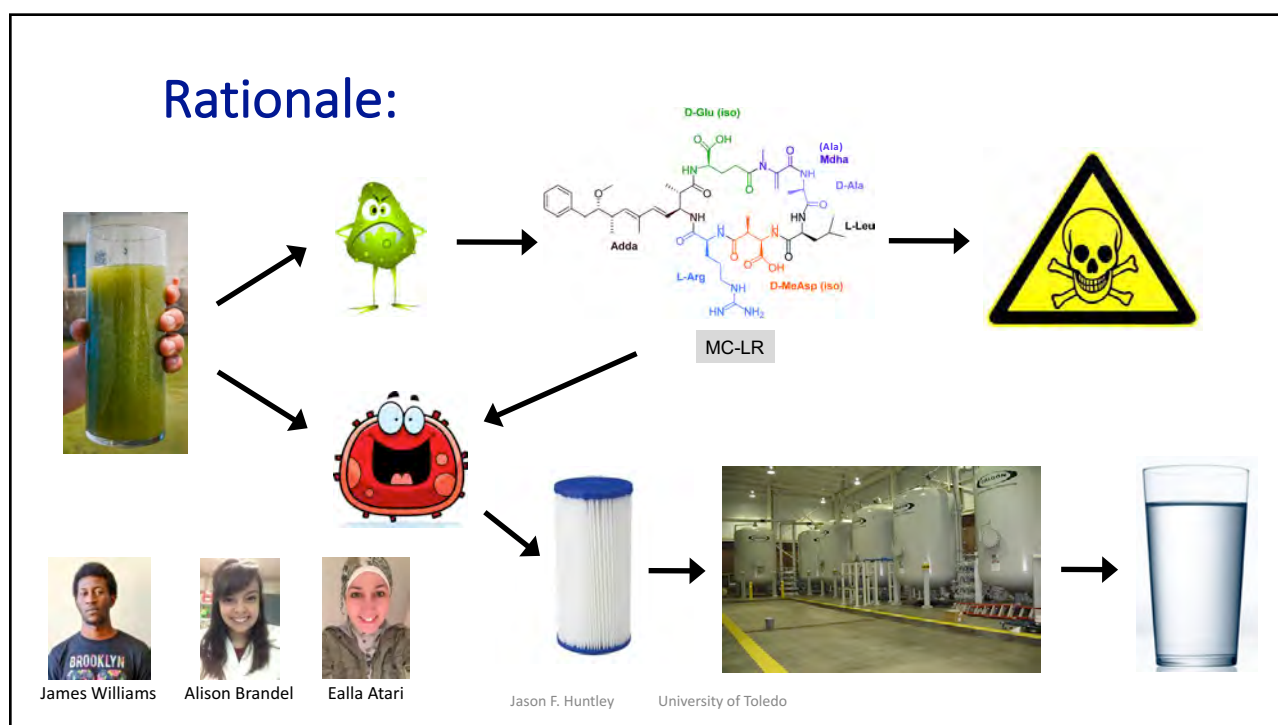


The Guardian
March 11, 2016

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Rationale:



Evidence for Microcystin-LR (MC-LR) Degradation



APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Nov. 1996, p. 4086-4094
0099-2240/96/040086-09

Vol. 62, No. 11

Enzymatic Pathway for the Bacterial Degradation of the Cyanobacterial Cyclic Peptide Toxin Microcystin LR

DAVID G. BOURNE,^{1,2,3} GARY J. JONES,^{2*} ROBERT L. BLAKELEY,¹ ALUN JONES,⁴ ANDREW P. NEGRU,^{2*} AND PETER RIDDLES¹
¹Department of Biochemistry¹ and Centre for Drug Design and Development,² University of Queensland, St. Lucia, Queensland, 4072; ³CSIRO Division of Water Resources, Griffith, New South Wales, 2080; and ⁴CSIRO Division of Tropical Animal Production, Indooroopilly, Queensland, 4068, Australia

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Int. J. Mol. Sci. 2018, 11, 896-911; doi:10.3390/ijms11030896

International Journal of
Molecular Sciences
ISSN 1422-0067
www.mdpi.com/journal/ijms

Degradation of Microcystin-LR and RR by a *Senotrophomonas* sp. Strain EMS Isolated from Lake Taihu, China

Jin Chen^{1,2}, Liang Bin Hu², Wei Zhou^{1,2}, Shao Hua Yan^{1,2}, Jing Dong Yang^{1,2}, Yan Feng Xue^{1,2} and Zhi Qi Shi^{1,2,*}

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Evidence for Microcystin-LR (MC-LR) Degradation



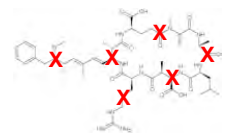
- Diverse bacterial phyla responsive to MC-LR
 - *Acidobacteria*, *Actinobacteria*, *Bacteroidetes*, *Planctomycetes*, *Proteobacteria*
- Alternative MC-LR degradation pathways likely exist in Lake Erie
 - *mlrA* genes not over-represented
- Decreases in MC-LR but degradation not examined

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Questions / Goals

- Can naturally-occurring Lake Erie bacteria degrade MC-LR?



- Can MC-LR degrading bacteria form biofilms and purify drinking water?



- Can MC-LR degrading enzymes be purified for point-of-source use?

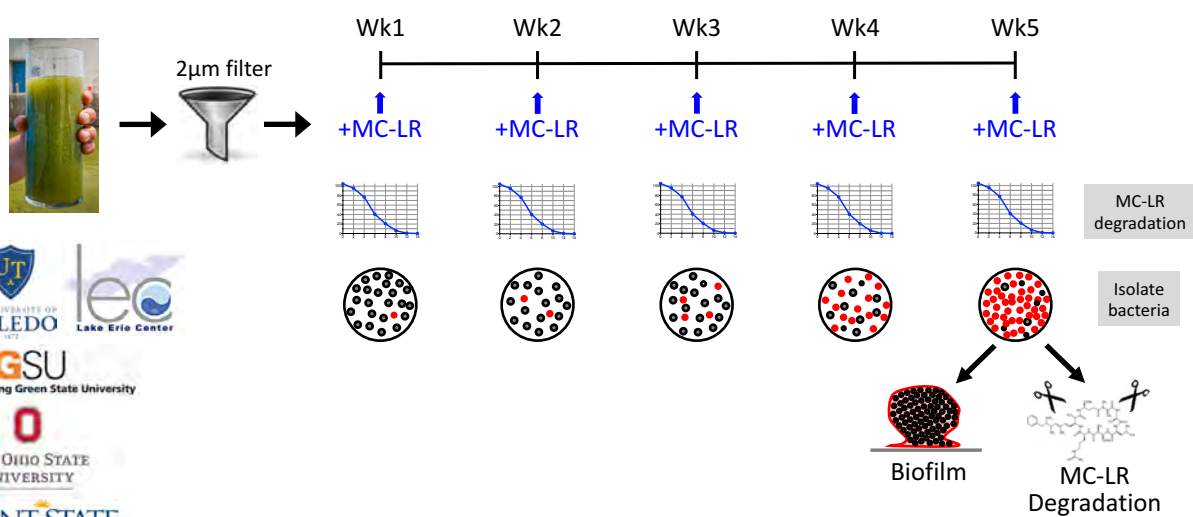


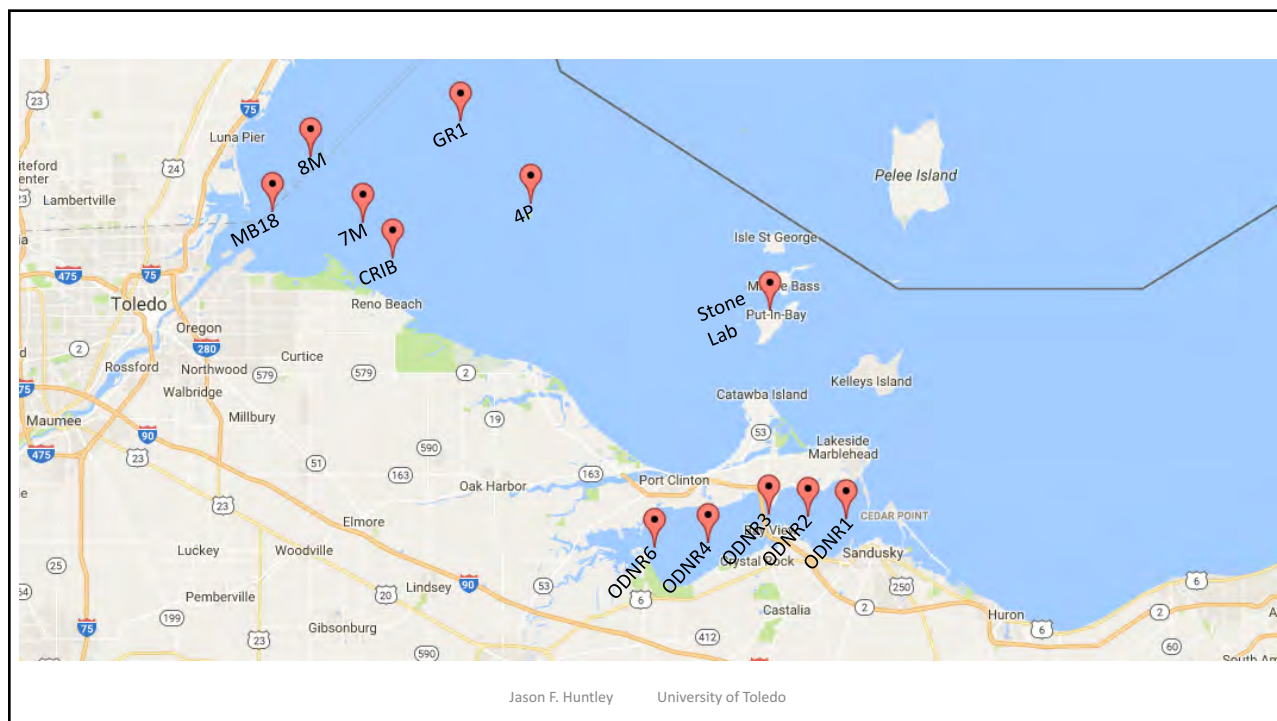
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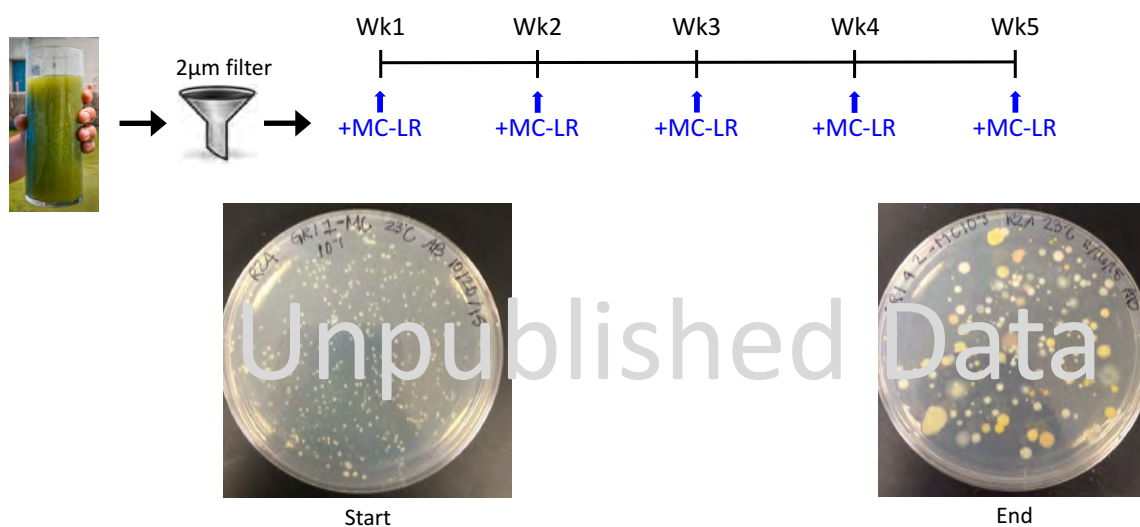


Project Outline



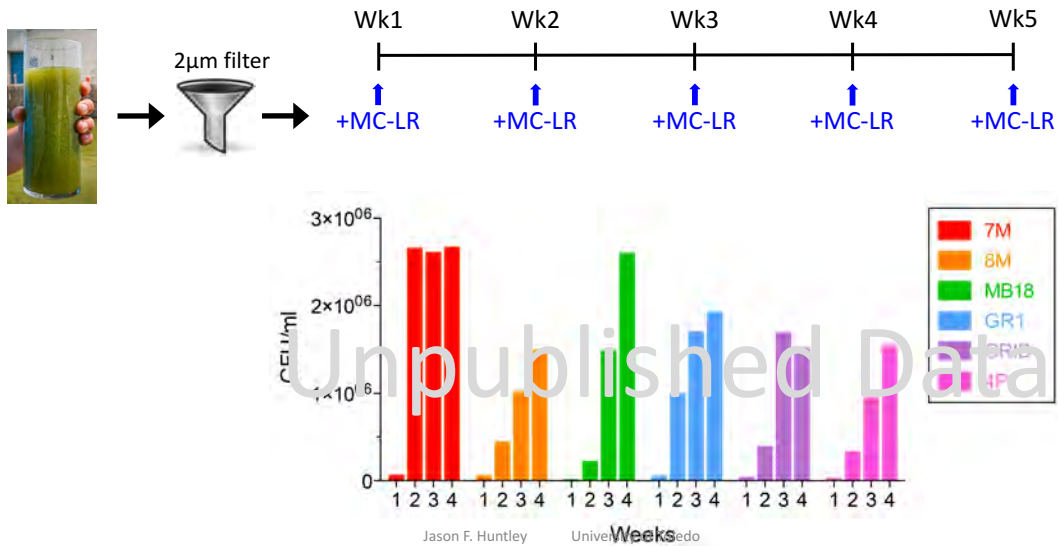


Selection for MC-LR Degradors

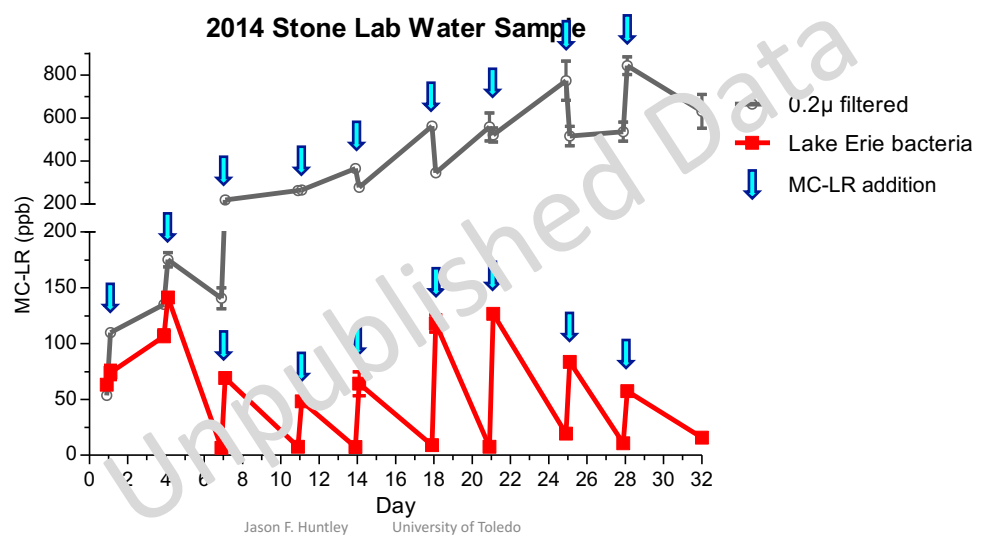


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Selection for MC-LR Degraders



Selection for MC-LR Degraders



Is MC-LR Degraded by Our Bacteria?

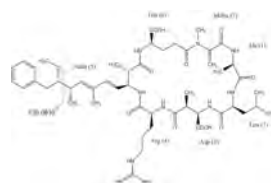
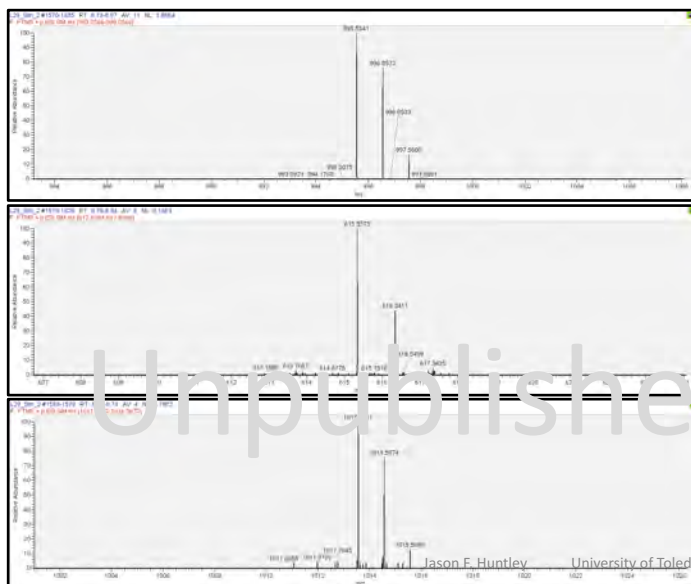


Dragan Isailovic, Ph.D.
Department of Chemistry and Biochemistry

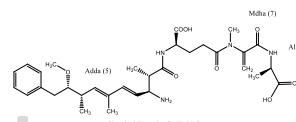
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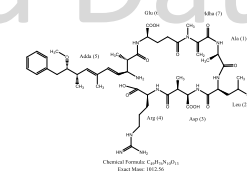
Is MC-LR Degraded by Our Bacteria?



Purified
MC-LR

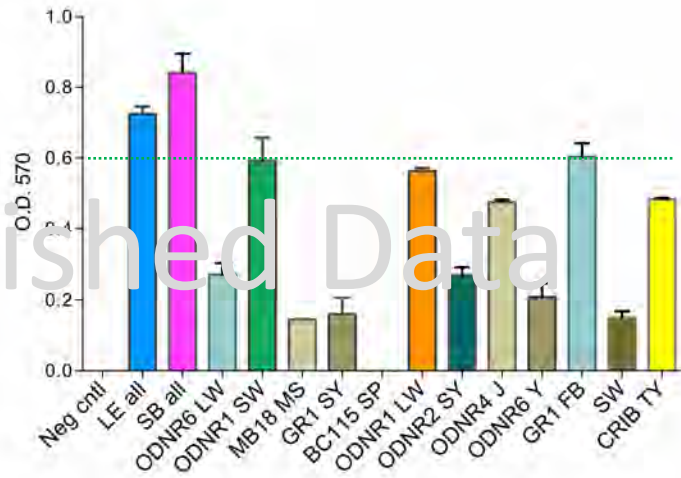


Tetrapeptide
detected in
our samples:
**20-times less
toxic**



Linear product
detected in
our samples:
**160-times
less toxic**

Can MC-LR Degraders Form Biofilms?



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APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Jan. 2008, p. 352–358
0099-2446/08/010352-07 doi:10.1128/AEM.01706-07
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Vol. 74, No. 2



Biodegradation 12: 393–400, 2001.
© 2002, Kluwer Academic Publishers. Printed in the Netherlands.

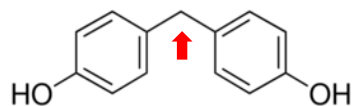
393

Degradation of Bis(4-Hydroxyphenyl)Methane (Bisphenol F) by *Sphingobium yanoikuyae* Strain FM-2 Isolated from River Water[†]

Daisuke Inoue,¹ Shoji Hara,¹ Mari Kashiwara,¹ Yusaku Murai,¹ Erica Danzl,¹ Kazunari Sei,¹ Shinya Tsunoi,² Masanori Fujita,^{1,3} and Michihiko Ike^{1,*}

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Received 25 July 2007/Accepted 6 November 2007

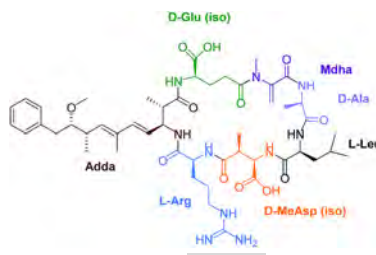
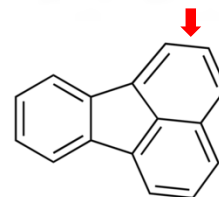


Fluoranthene degradation in *Pseudomonas alcaligenes* PA-10

Linda Gordon & Alan D.W. Dobson*

Department of Microbiology, National University of Ireland, University College, Cork, Ireland (*author for correspondence)

Accepted 31 October 2001



MC-LR

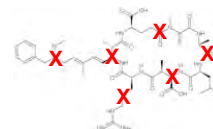
9/19/16

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Current and Future Studies

- Testing individual clones and groups for MC-LR degradation
- Test biofilm formation on powdered activated charcoal (PAC)
- Lab-scale water purification to test biofilter efficiency
- Identify MC-LR degradation pathway using RNAseq (transcriptional analysis)



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