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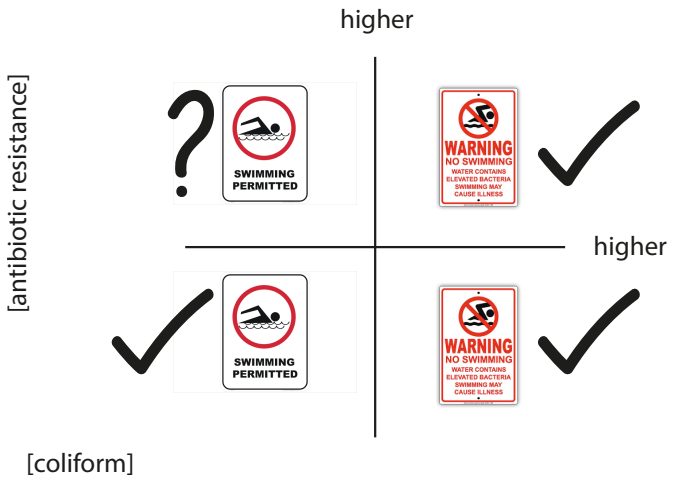
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha

Current Regulations



Unavoidable exposures

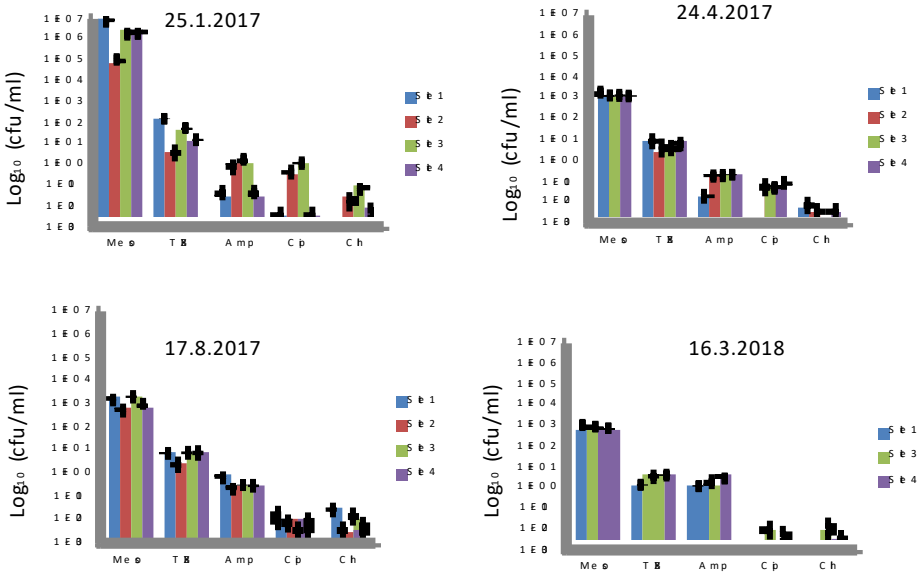
Havelock North Bore 1

Heathcote River Christchurch

Hurricane Ike storm surge

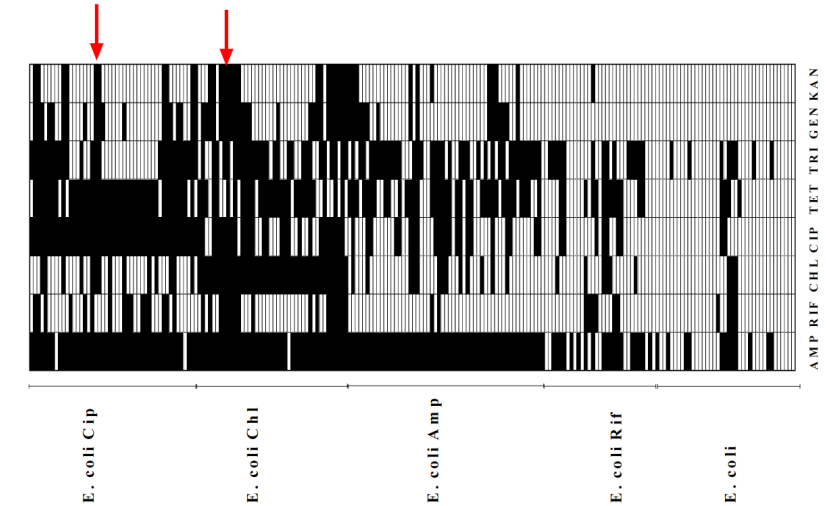
Avon/Ōtākaro

Avon water



Frequency of multi-resistance

MDR profile of *E. coli* isolates from Avon River and Silver Stream



Frequency of multi-resistance

Resistance means:

10µg/ml AMP

6µg/ml CHL
1µg/ml CIP

10µg/ml TRI

5µg/ml GEN
5µg/ml KAN

Table3.2: Profile of multi-drug resistant *E. coli* isolates from Avon River and Silver Stream.

isolates	total	Source	Resistance* % AMP	RIF	CHL	CIP	TET	TRI	GEN	KAN
E. coli CIP	52	Avon 48	97.92	33.33	31.25	100	87.50	54.17	37.5	18.75
		Silver 4	25	0	0	100	100	50	0	0
E. coli CHL	47	Avon 41	97.56	41.46	100	58.54	68.29	68.29	53.66	36.59
		Silver 6	83.33	33.33	100	0	100	0	0.00	0
E. coli AMP	90	Avon 55	100	3.64	25.45	40	63.64	65.45	29.09	16.36
		Silver 35	62.86	20	8.57	2.86	28.57	14.29	0	0
E. coli	54	Avon 38	21.05	10.53	7.89	5.26	10.53	21.05	0	0
		Silver 16	25	12.50	12.50	0	12.50	0	0	0

CIP MIC

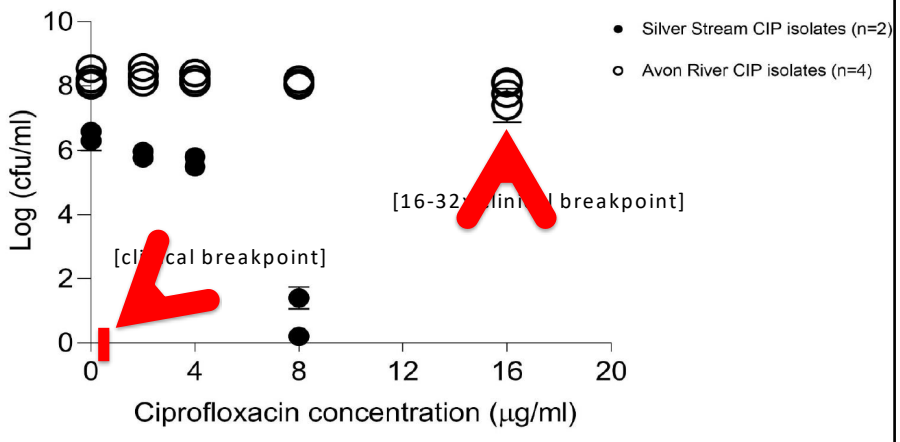


Figure 3.2. Dose response curve of ciprofloxacin resistant *E. coli* from Avon River (opened dot) and Silver Stream (closed dot). Dose curve is reported as the log-transformed CFU/mL count ± SEM (n = 4). This curve was used to determine the difference in the ciprofloxacin resistant *E. coli* from the two rivers.

β-lactam MIC

AMP	Cefotaxime >8µg/ml	Cefotaxime <6µg/ml	Cefotaxime <2µg/ml
35 (Avon Park locations 1-4)	12 (34%)	11 (31%)	12 (34%)
7 (Avon upstream location)	0 (0%)	0 (0%)	7 (100%)
15 (Silver Stream)	0 (0%)	1 (6%)	14 (93%)

ESBL

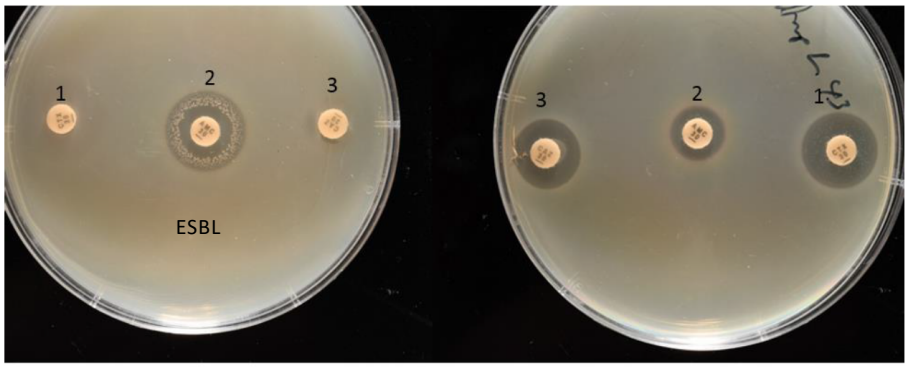


Figure 3.3. Confirmation of extended-spectrum beta-lactamase producing *E. coli* isolate using amoxicillin-clavulanic acid, cefotaxime and ceftazidime. Note: 1-cefotaxime, 2-amoxicillin-clavulanic acid, 3-ceftazidime.

Conclusions

Antibiotic resistant *E. coli* were routinely isolated from both a rural & urban river in Canterbury

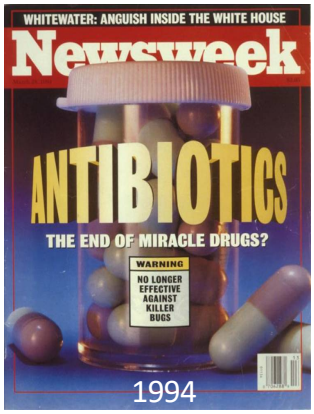
Frequencies of resistance were as high as 21% for the 3 different drugs screened (AMP, CHL, CIP) from TBX isolated *E. coli*

Frequencies of MDR from the Avon River were as high as 98% (when second drug was AMP) and >16%.

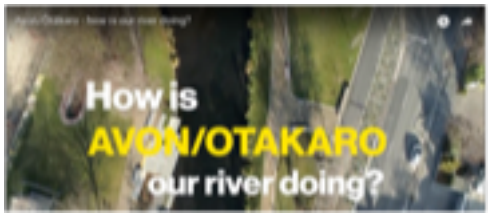
Silver Stream had significantly lower MDR rates.

MIC for CIP ranged from <1µg/ml to >32µg/ml.

Cephalosporin resistance and ESBL found at frequencies of 34% and 42% (among MIC >8µg/ml)



Future work



Continue sampling over time, over longer range of Avon River.

Test potential link between agrichemical use and resistance.

In collaboration with ESR Christchurch and Amy Osborne (UC), complete WGS genotyping.

Characterise potential for resistance HGT.

Along with Matt Stott (UC), expand coverage region to nation wide.

Continue to work with ecologists to look for remediation strategies

Acknowledgements

Reducing bacterial loads important, but not enough.

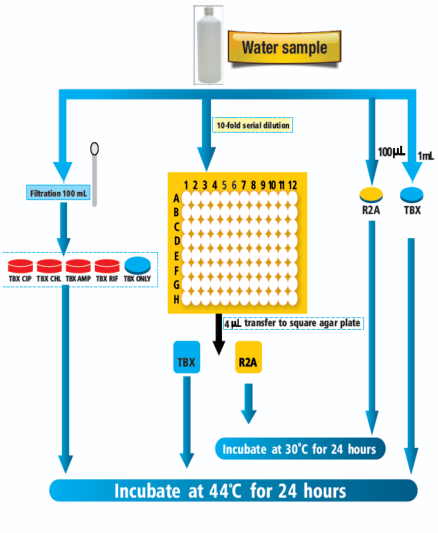
Mitja Remus-Emsermann, UC
Jon Harding, UC
Carlos Amabile-Cuevas, Mexico City
William Godsoe, Lincoln U

Thank you to the organisers and Catchments Otago for travel and expenses

Funding for this research
University of Canterbury

"Not yet."

Methods



Avon water-Harper Ave