



Bacterial Source Tracking

Little Brazos River Tributaries Bacteria Assessment Project

Terry Gentry

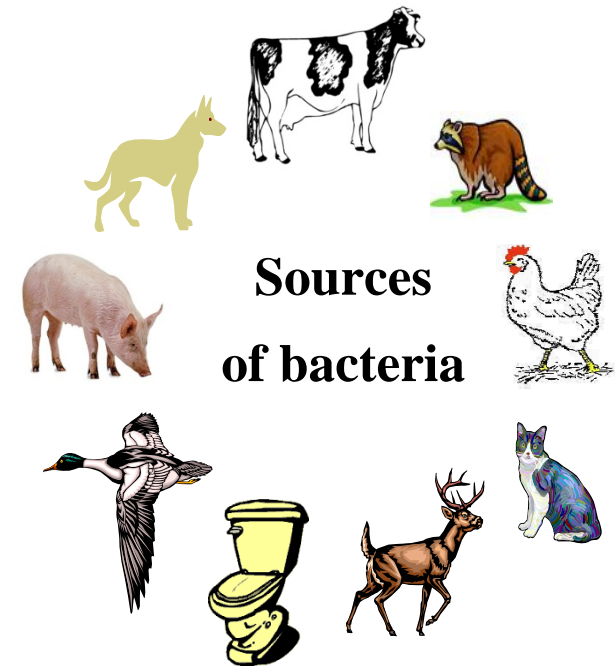
*Soil & Aquatic Microbiology Laboratory
Department of Soil & Crop Sciences
Texas A&M University*

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Improving Life through Science and
Technology.

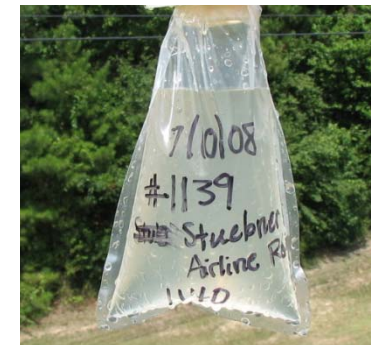
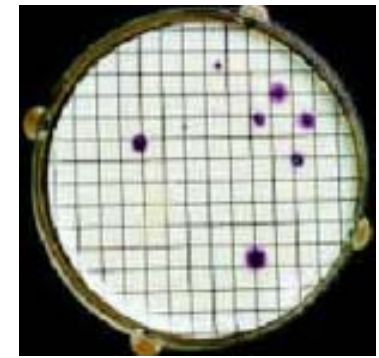
What is Bacterial Source Tracking (BST)?

- Data collection and analysis to determine the sources of fecal contamination in a waterbody
- Based on uniqueness of bacteria from individual sources
- A variety of different methods are used
- Differs from modeling in that it is not a predictive tool and does not require calibration and validation of input variables



BST Methods

- A variety of different methods have been used
- Can be classified according to approach:
 - Phenotypic v. Genotypic
 - Library-dependent v. Library-independent



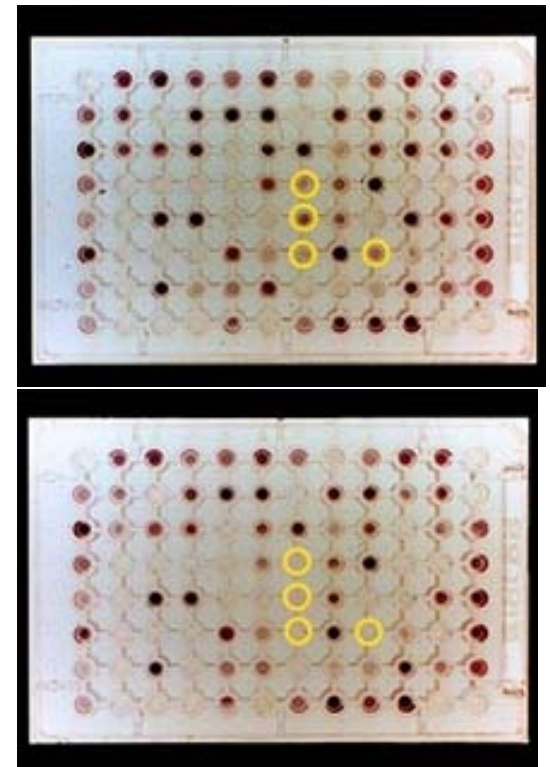
Phenotypic BST Methods (Library-Dependent)

Methods:

- Kirby-Bauer Antibiotic resistance analysis (ARA)
- Carbon source utilization (CSU)

Advantages/Disadvantages:

- Less expensive
- Less discriminating



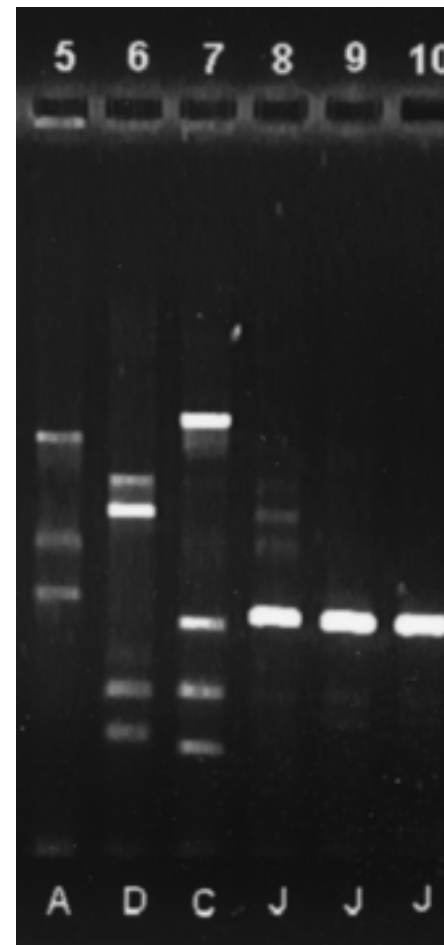
Genotypic BST Methods (Library-Dependent)

Methods:

- **DNA fingerprinting**
 - **Enterobacterial repetitive intergenic consensus sequence-polymerase chain reaction (ERIC-PCR)**
 - **RiboPrinting[®] (RP)**

Advantages/Disadvantages:

- **More expensive**
- **More discriminating**

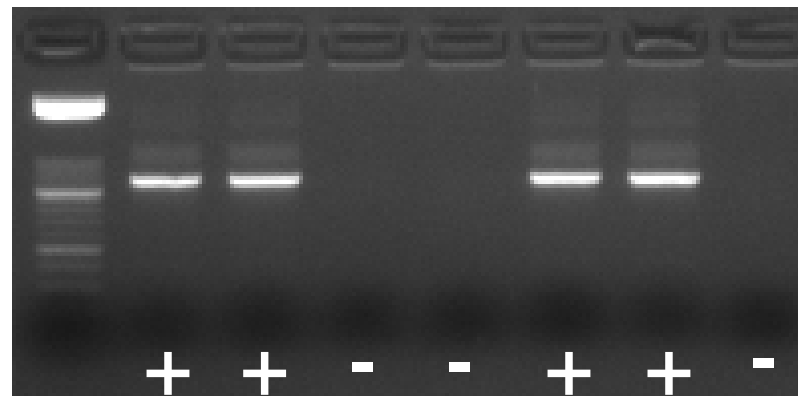
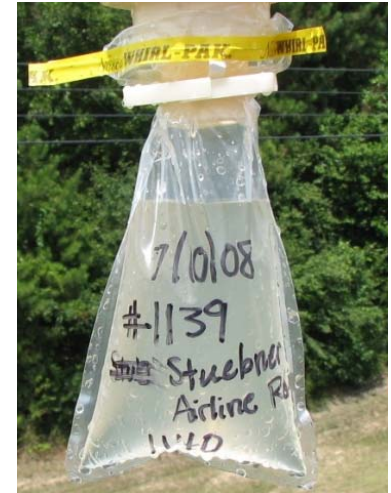


Library-Independent BST

Approach:

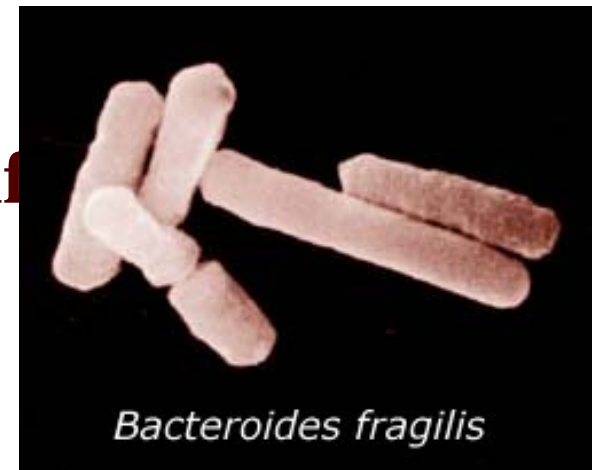
- Genotypic detection of microorganisms based on marker genes (DNA)
- Does not require known-source library
- Most common approach targets

Bacteroidales



What are *Bacteroidales*?

- More abundant in feces than *E. coli*
- Obligate anaerobes – less likely to multiply in environment
- Subgroups appear to be host specific
- Markers available for humans, ruminants, horse, swine
- Not pathogens



http://www.sourcemolecular.com/new_site/_images/bacteroidetes.jpg

Library-Independent BST

Considerations:

- **Rapid and less expensive than library-dependent methods**
- **Limited markers – human, ruminant, horse, swine for *Bacteroidales***
- **New markers being developed**

BST for Little Brazos River Tributaries

- **Limited library-dependent**
 - Analyze *E. coli* from ~80 water samples from across the study area using both ERIC-PCR and RP fingerprinting
- **Library-independent**
 - Analyze ~250 water samples from across the study area using *Bacteroidales* PCR for human, ruminant, horse, and swine markers

BST for Little Brazos River Tributaries

Parameter	2009								2010	
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
<i>Bacteroidales</i>										
Stream (10)	X	XX	X	XX	X	XX	XX	X	X	XX
WWTFs (3)		X			X			X		X
Storm - Stream (10)		X			X			X		X
Storm - WWTFs (3)		X			X			X		X
<i>E. coli</i> (ERIC-RP)										
Stream (10)		X			X			X		X
WWTFs (3)		X			X			X		X
Storm - Stream (10)		X						X		
Storm - WWTFs (3)		X						X		

Next Steps for BST

- **Brazos River Authority will conduct the source surveys for each stream and the outcomes will help AgriLife Research understand usefulness of existing known source library for BST**
- **Brazos River Authority will begin collecting water samples and AgriLife Research will begin BST on a subset of those samples – May 2009**
- **AgriLife Research will be back at a stakeholder meeting in ~September 2009 to provide an update on the progress of BST**
- **BST should be completed ~February 2010**

Questions?

Terry Gentry

2474 TAMU

Texas A&M University

College Station, TX 77843

Phone: (979) 845-5323

Email: tgentry@ag.tamu.edu