



This research has contributed to provide new tools for accurate identification of fecal sources of *E. coli*. for water safety in agricultural watersheds.

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## Novel *Escherichia coli* genetic markers for water safety

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### Who cares and why?

*Escherichia coli* are used worldwide as fecal bacteria indicator for water quality monitoring and water safety management. This practice is based on the assumption that *E. coli* are commensally intestinal bacteria of warm-blooded animals. However, recent studies suggest that there is a significant part of the global *E. coli* population that are “naturalized” in various environments, circulating and persisting outside of animal intestinal tracts. The existence of “naturalized” *E. coli* has seriously challenged the aforementioned assumption and raised questions around the explanation of *E. coli*-based water monitoring data and the assessment of water safety, because “naturalized” *E. coli* can contribute to the high number of *E. coli* in water and subsequently cause false alarms of fecal pollution. Therefore, there is a critical need to develop methods to differentiate enteric *E. coli* from the environmental bacteria, including naturalized *E. coli* populations, to improve current practice of *E. coli*-based water quality monitoring.

### What has the project done so far?

This project has investigated the genetic differences between enteric and “naturalized” *E. coli* and discovered that the putative glucosyltransferase gene (*ycjM*) is highly associated with enteric (fecal) *E. coli*. A new method based on this gene has been developed to differentiate enteric *E. coli* from “false” *E. coli* bacteria, which is superior to currently used methods. Furthermore, a new method has been created to differentiate human-specific *E. coli* from other sources of enteric *E. coli* for water monitoring and quality assessment.

### What research is needed?

The new developed methods by this research have been tested locally and need to be verified using various samples collected from a variety of locations across the States for a board application.

### Impact Statement

By improving upon current methods, the new methods are likely to be more effective in monitoring and managing water quality. Applying such methods can better protect residents in the state and the nation from waterborne diseases that result from human feces-polluted water.

## For more information:

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Additional link can be found at <http://www.umes.edu/ard/Default.aspx?id=46285>

