Molecular Tracers of Organic-Matter Sources to Drinking-Water Supplies

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We investigated the utility of various compounds for use as molecular tracers of contaminant sources in drinking-water supplies. Contaminant sources included wastewater treatment plants (WWTP), agricultural/feedlot runoff, urban/suburban runoff, and nature. After analysis of source materials, we selected the following tracers: fecal steroids, laundry detergent fragrances, caffeine, nonylphenols, polycyclic aromatic hydrocarbons, *n*-alkanes, and the unresolved complex mixture (UCM). Results were then correlated with measures of land-use obtained through surveys of drinking-water utilities.

Water samples (4 liters) were extracted using C-18 disks. Tracers were quantified using GC/MS, with selected ion monitoring to improve sensitivity.

Tracers associated with WWTP effluent, including coprostanol, fragrances, and caffeine, correlated well with each other, as did groups of molecular tracers targeted for other sources. Tracers also correlated with land-use values associated with their target source. For example, WWTP molecular tracers correlated with variables such as wastewater discharge and combined-sewer overflows. Urban tracers, such as UCM, correlated with transportation and other urban measures. Agricultural tracers correlated with factors such as feedlot runoff and animal densities of cattle.

When the watersheds were ranked according to increasing urban and agricultural influence using their molecular tracers, the influence of natural sources decreased, as would be expected where anthropogenic activity is greater.

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