

## Dissolved Organic Matter Biogeochemistry

This project is focused on the interrelationship of microbial stream ecology and organic matter biogeochemistry.

Objectives: The four central research objectives are (1) determine the diversity of dissolved organic matter (DOM) and the diversity of the heterotrophic bacterial community in different biomes; (2) determine the abilities of bacteria from streams in different biomes to metabolize the DOM in streamwater from other streams within the same biome and from streams in other biomes; (3) determine DOM diversity in streamwater and heterotrophic bacterial diversity and activity in different seasons and following storm disturbance within a single stream: and (4) determine the biomass, production and diversity of bacterial communities exposed to either constant or variable DOM regimes.

How do we do it?: We are studying nine streams lying within the Eastern deciduous biome (Pennsylvania), the Southern coniferous biome (New Jersey), and the Tropical evergreen biome (Costa Rica). Our specific group objectives are to characterize DOM and includes  $^{13}\text{C}$  NMR, tetramethylammonium hydroxide thermochemolysis (TMAH)-GC-MS and electrospray ionization mass spectrometry (ESI-MS).  $^{13}\text{C}$  NMR is a powerful tool to get an overall functional group distribution in DOM samples (Figure 1). TMAH-GC-MS is a chemical degradation method that is very useful to analyze fatty acid and lignin components in DOM (Figure 2). High resolution ESI-MS has been employed to investigate the composition of DOM. ESI-MS data has revealed that DOM is comprised of very complicated mixture with several peaks at almost every nominal mass to charge unit (Figure 3).

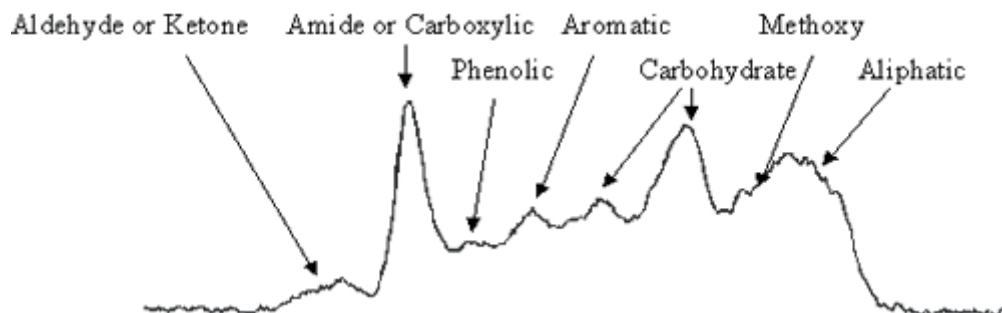


Figure 1. Solid state  $^{13}\text{C}$  NMR spectrum of DOM

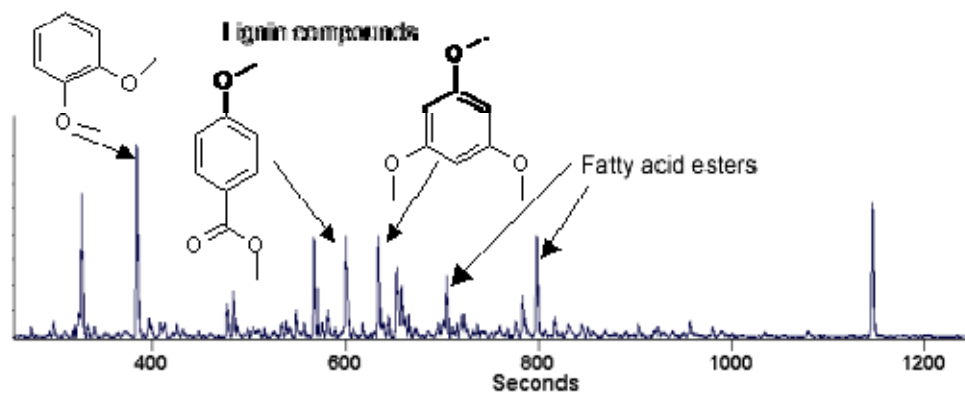


Figure 2. TMAH-GC-MS spectrum of DOM

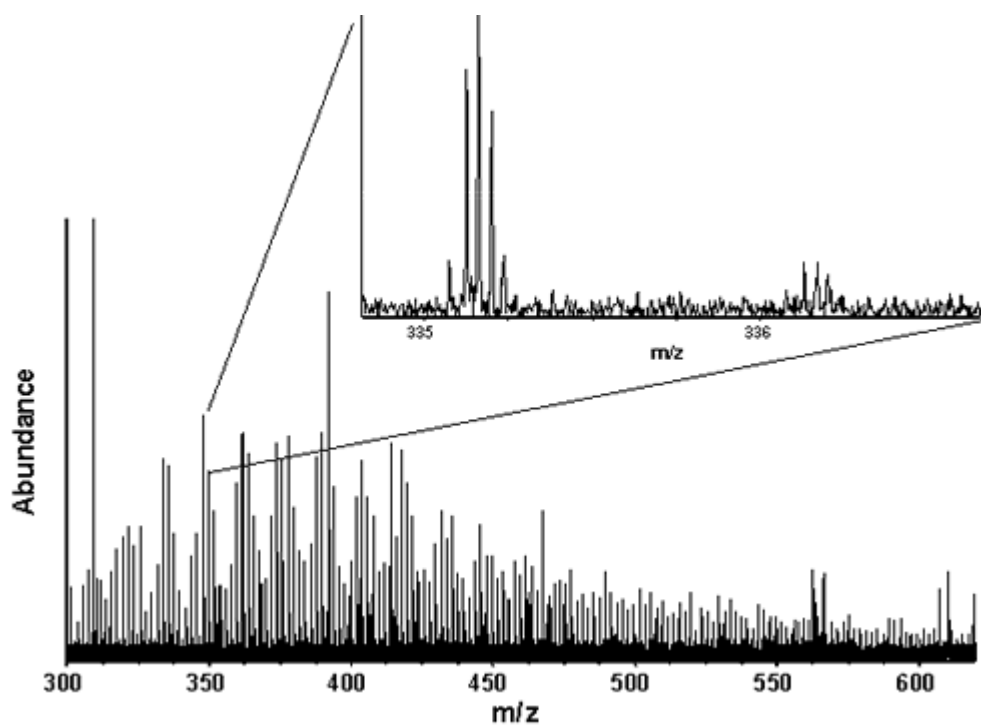


Figure 3. High resolution ESI-MS spectrum of DOM