USGS
science for a changing world

Reston Microbiology Lab

The **Reston Microbiology Laboratory (RML)** is a research and fee-for-service laboratory located in the USGS National Research Program of the Water Mission Area. The lab conducts research in the fields of microbial ecology, geomicrobiology, biogeochemistry, and the hydrologic sciences.

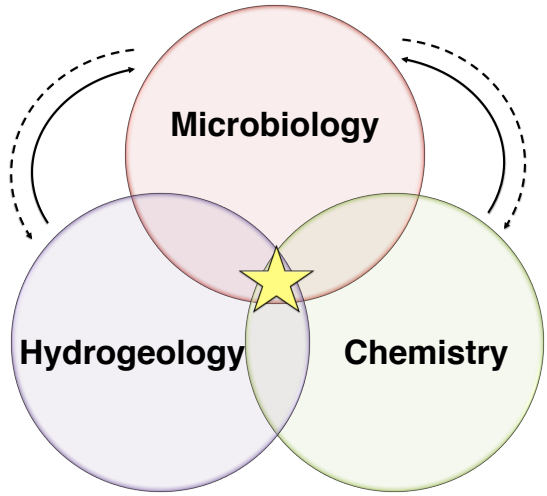
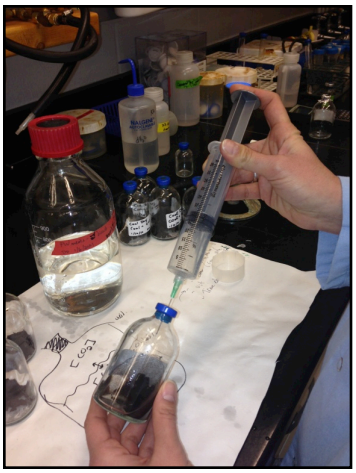


Figure 1. RML research is highly interdisciplinary and at the interface between microbiology, chemistry and geology.



USGS scientist cultivating anaerobic microorganisms from coal wells.

Microbes, the unseen majority of organisms on our planet, catalyze reactions of global importance, which have critical impacts on water quality and environmental health.

Goals:

- To understand interactions between microbes and their environment.
- To link environmental microbial community structure (e.g., phylogeny and identity) with microbial function (e.g., metabolism and mineral interactions).

Hot Topics

- Unconventional oil and gas development
- Carbon cycling
- Coal bed methane
- Crude oil and chlorinated solvent bioremediation
- Amphibian disease

Collaborators & Funding

- RML collaborates with USGS scientists across the agency (Water, Energy & Minerals, and Ecosystems MA), universities, and other federal agencies.
- Funding is provided by USGS programs and other federal agencies:
  - Toxic Substances Hydrology Program
  - National Water Quality Program
  - Energy Resources Program
  - NASA

Stakeholders

- U.S. Dept. of the Interior (BLM, NPS, FWS)
- U.S. Environmental Protection Agency
- U.S. Department of Energy
- National Institute of Environmental Health Sciences (NIEHS)
- State and local agencies

Capabilities:

- Microbiology
  - Anaerobic, microaerobic, and aerobic cultivation and isolation
  - Microscopy
- Molecular biology
  - Microbial community analysis (e.g., next-generation sequencing, fingerprinting)
  - Quantitative PCR (qPCR)
  - Stable isotope probing (SIP)
  - Genomics and metagenomics
- Biogeochemistry
  - Laboratory microcosms & column experiments
  - Gas and liquid chromatography
  - UV/VIS spectrophotometry

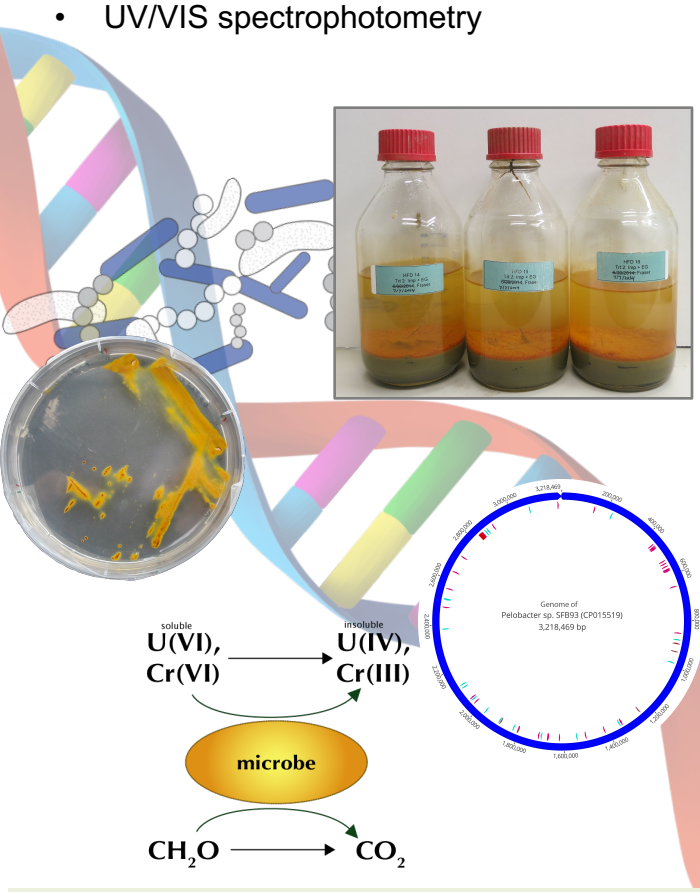


Table 1. List of currently available fee-for-service assays.

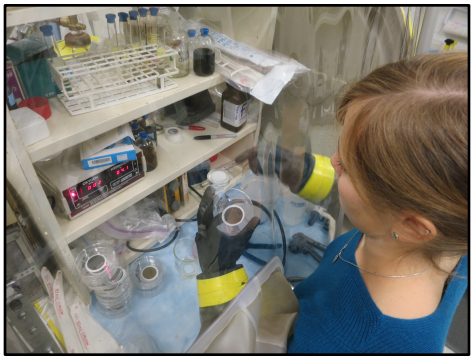
Amphibian Pathogen Detection

- DNA extractions from amphibian swabs and water samples
- Quantification (qPCR) of *Batrachochytrium dendrobatidis* (Bd, chytrid fungus)
- qPCR standards

Environmental Sample Analysis

- DNA extractions from soils, sediments, and water samples
- qPCR assays available for:
  - Total Bacteria
  - Total Archaea
  - Sulfate-reducing bacteria (dsrB)
  - Geobacteraceae
  - Vinyl chloride reducers (vcrA)
  - Dehalococcoides
  - Methanogens (mcrA)
  - Methanomicrobiales
  - Methanosarcina
  - Methanosaeta
- Illumina MiSeq 16S iTag sequencing and analysis

USGS scientist preparing samples for DNA-based analyses.



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