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*How Well Is Your Well: The Effect of Hydrofracking Fluids on a Eukariotic Species*

My project started when I read an article last fall in the Gazette newspaper. It described contaminated domestic well water near the Pavilion, WY gas field. The E. P. A. suspected that the contamination was related to Hydraulic Fracturing, a very effective way of improving recovery of gas from tight impermeable rocks. Methane was found along with chemicals used as additives in the water-based “fracking” fluid.

I was concerned that these chemicals might be a significant hazard to the aquatic environment, as well as to people and livestock. I decided to expose *Daphnia pulex*, a small “water flea” at the lower end of the food chain, to 5 serial dilutions of 7 commonly used “fracking” additives (naphtha, hydrochloric acid, terpene, methanol, ethanol, propanol and formaldehyde). Concentrations of 1/10K (close to what is pumped down a gas well), 1/100K, 1/1M, 1/10M and 1/100M for each of the 7 additives (the independent variables) were put in petri dishes with 5 *Daphnia* apiece. *Daphnia* in distilled water were used as the Control. Lifespan and heart rate (the dependent variables) were noted daily in each of the 36 petri dishes.

My results confirm that the 7 additives are lethal at the concentrations (1/10K) pumped into the ground and less so in the weaker dilutions. Terpene showed the most direct correlation between concentration and toxicity; ethanol seemed to be the least harmful.

I conclude that one cause of fracking chemical contamination could be from a spill at the surface or leakage from waste fluid storage. The other means of harmful contamination would be a direct path from the “fracked” zone up the outside of the casing toward the surface, past bad casing cement, which explains the deep-sourced methane found by the E. P. A. in domestic well water.

The appearance of baby *Daphnia* right after the adults died is very interesting. These babies may have tolerance to the chemicals they were born in. Next year’s project could be a multi-generation mutation study of *Daphnia* in these conditions.