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Comment on "Acute Toxicity Screening of Water Pollutants Using a Bacterial Electrode"

SIR: This concerns an article by Dorward and Barisas (*1*) that was recently published in ES&T.

First, I do not understand the basis for the apparent inconsistent comparison of three methods of measuring acute toxicity of materials in aquatic systems. For two of the methods (fish tests and bioluminescent bacteria tests), results are reported as median-effect concentrations (LC50's and EC50's, respectively). For the authors' proposed method with *Escherichia coli*, however, "inhibition levels of 40% were chosen..." It seems to me an arbitrary and illogical choice, one that serves only to bring the *E. coli* test results more in line with fish and bioluminescent bacteria test results.

Second, because only 7 of the 12 substances tested with *E. coli* "...yielded dose [concentration]–effect relationships which have provided useful toxicological information", I question the validity of the proposed method. A test that produces useful information <60% of the time is not practical.

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(1) Dorward, E. J.; Barisas, B. G. *Environ. Sci. Technol.* **1984**, *18*, 967–972.

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SIR: I should like to respond to Parrish's letter (*1*) concerning our recent article which appeared in *Environmental Science & Technology* (*2*).

In response to Parrish's first query, we compared results from the various toxicity assays in as direct a way as possible. For our bacterial electrode assay, we report toxicant levels that inhibit *Escherichia coli* CO_2 production by 40%. This level was chosen because it represents approximately half the maximum inhibition observed among various toxicants in short-term experiments. The Beckman Microtox assay results are directly comparable quantities, namely, toxicant levels that reduce bacterial bioluminescence 50% after 15 min. LC_{50} values obtained in rainbow trout bioassays are, of course, difficult to compare directly with results of *either* of the above methods. In any case, we present, for all assays, toxicant levels that reduce the parameter of interest—CO_2 production, light production, or organismal viability—by 40–50% in the test system.

With regard to Parrish's second point, we do not propose the *E. coli* electrode as a practical substitute for any existing toxicity assay. Our data show, as he notes above, that various substances highly toxic to higher organisms have little effect on the respiration of this bacterium. Our motivation in presenting the *E. coli* electrode was rather, as we stated, to provide data "to guide the development of other instrumental toxicity bioassays".

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