



Evidence for facilitated uptake of Hg(II) by *Vibrio anguillarum* and *Escherichia coli* under anaerobic and aerobic conditions

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Limnol. Oceanogr., 47(4), 2002, 967-975 | DOI: 10.4319/lo.2002.47.4.0967

ABSTRACT: A *mer-lux* bioreporter was used to study uptake of inorganic mercury, Hg(II), at trace concentrations by two facultatively anaerobic bacterial species, *Vibrio anguillarum* and *Escherichia coli*. Uptake of Hg(II) by these bacteria appeared to be facilitated, rather than by passive diffusion. Three lines of evidence support this conclusion. First, under anaerobic conditions Hg(II) uptake was greatly decreased compared with aerobic conditions, even though the chemical composition of the medium was identical except for the lack of oxygen (i.e., no reducing agents were used). Second, the uptake of Hg(II) under anaerobic conditions was not proportional to the abundance of lipophilic Hg species but was dependent on the total concentration of Hg in the samples. Third, at trace Hg(II) concentrations and under anaerobic conditions, Hg(II) uptake was enhanced by the addition of yeast extract and a variety of low molecular weight organic acids. In addition to demonstrating that Hg(II) uptake by these bacteria had the characteristics of facilitated transport, these lines of evidence also support the conclusion that processes under regulatory control of the cell affected Hg(II) uptake. If these findings apply to other bacteria as well, they mean that current models of Hg(II) uptake by microorganisms in aquatic systems, which are based solely on the role of lipophilic Hg species and passive diffusion, will need to be reconsidered.

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