TR-172

The Use of Remotely Sensed Bioelectric Action Potentials to Evaluate Episodic Toxicity Events and Ambient Toxicity

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- Full Text

The exposure of an organism to a toxicant is defined by the magnitude, duration, and frequency with which the organism(s) interact with the toxicant(s). Predicting the exposure of organisms to toxicants during episodic events such as those resulting from storm water runoff is very difficult. The research reported here describes a non-invasive, or minimally invasive, system that measures in real-time or near real-time, clam gape. Clams have been shown to change gape in the presence of toxicants i.e., they "clam up". The organism used in the development of this system was the Asiatic clam (Corbicula fluminea). A marine bivalve (Brachidontes recurva) was used when the monitoring system was deployed in a marine environment.

The major components of the system include industrial proximity sensors, single board computer, amplifier, wireless transceiver, and in remote applications solar generated electrical power. Clam gape and physical/chemical data are transmitted in real-time, or near real-time, to a central laboratory. In addition, when a toxic event is detected the system is designed to initiate water samplers while notifying the central location that an event has occurred. Water samples collected during an event can be verified for toxicity, and the chemicals causing toxicity identified using toxicity identification techniques.

We are continuing to perform experiments to identify those changes in clam gape that can be used as triggers to distinguish toxic events from non-toxic events. If these experiments are successful the deployment of remote biosensors as part of watershed management schemes should help identify toxicants causing problems and lead to management strategies to minimize their impact.

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