NEW IMPROVMENTS IN BIOMONITORING AND RISK ASSESSMENT BY MOLLUSK VALVE OPENING ANALYSIS

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The ability of mollusk bivalve to close their shell in response to contaminants has often been used as an aquatic pollution biosensor. The idea is to use this bivalve's ability to close their shell as an alarm signal. In this study a new plural approach associating a non-invasive technique coupled to a new statistically approach is presented. Our approach, using free ranging animals, lightweight magnetic sensors and a new waterproof electronic designed with multiplexor ability, enables us to simultaneously analyze the complex behavior of 16 bivalves. The analysis is continuous and, depending on the user choice, can be run for hours, days or months under laboratory or field conditions. A LabView program is developed to record the valve behavior complexity with respect to time. The data are downloaded to a biprocessor computer using the GPRS data transfer protocol by the mobile phone network. Non parametric regression model based on kernel estimator of the unknown error term distribution function is used to model the valve opening activity of each individual with respect to time. Using the model results, several parameters characterizing the mollusk behavior (mean velocity of valve response following exposure to various heavy metals, number of valve motion, time duration and frequency of opening and closing, opening/closing speed of major and minor valve movements, opening status, frequency of selected opening status) are computed. Future developments include the production of a website with visualization of statistical results. By comparison to the present simple valve recording, it should offer to the public a better basis for appreciating bivalve's behavioral changes, either in pristine or polluted marine and freshwater environments.