

CSET 413: Control Systems III 201 Introduction to Control Systems Bateson, Robert N. Guide to Data Analysis Techniques  
RUNNING HEAD: Introduction to Control Systems RUNNING HEAD: Data analysis techniques The detection of changes in the functional status of biological systems has received considerable attention. In some cases, it has been used to study genetic and developmental control, and to determine how such control is related to the control of physiological function. We describe three methods for monitoring and analyzing levels of cyclic AMP (cAMP) in tissues: the use of bioluminescent bacterial strains for cAMP; an in vitro method using bacterial sources of the enzyme adenylate cyclase; and an in vivo method using cAMP phosphodiesterase. In the first, the luciferase gene is cloned into the bacterium *Photobacterium leiognathi* and a strain is made which produces luciferase at very high levels. The medium is changed to medium containing cyclic AMP and the effect of increasing the cyclic AMP levels can be observed as a decrease in the luminescence. The second method is an in vitro modification of the well-known procedure for measuring adenylate cyclase using *Escherichia coli* as the source of the enzyme. In this method, the bacteria are incubated in the presence of an extract from the tissues which is known to contain adenylate cyclase and the cyclic AMP produced is measured after the incubation. The in vivo method of measuring cAMP levels uses a bacterial strain carrying a gene for a bacterial phosphodiesterase, which degrades the cyclic AMP. The bioluminescence of the bacteria is measured in the presence of a cyclic AMP producing system, and the decrease in bioluminescence which occurs when cyclic AMP is added is interpreted as a measure of the level of cAMP in the system. The three methods are compared and discussed. Introduction to Control Systems Robert N. Bateson ISBN 0-13-262754-7 Elsevier Science B.V. Description This textbook is a practical guide for students who have completed a first year course in control systems. The authors have written a complete discussion of the theory and practice of state-space modeling, a methodology used throughout the book, and a detailed treatment of nonlinear analysis and design of feedback controllers. This text is a popular choice with first

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