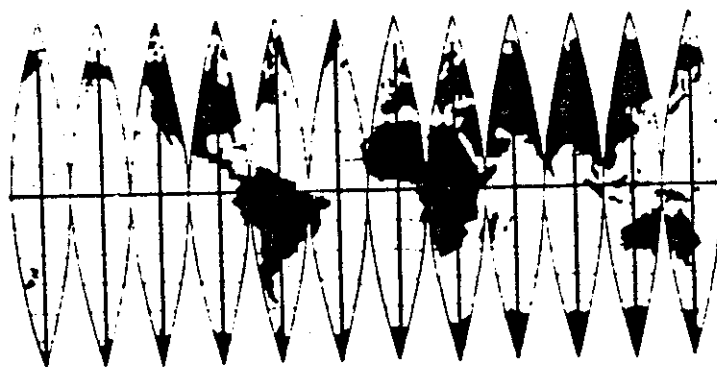


International Union of Biological Science

Proceedings

Second International Congress  
of  
Comparative Physiology and Biochemistry



August 1-5, 1988  
Louisiana State University  
Baton Rouge, Louisiana, U.S.A.

CORTISOL DIRECTLY STIMULATES  $\text{Na}^+, \text{K}^+$ -ATPASE ACTIVITY AND OUABAIN BINDING IN GILL TISSUE OF COHO SALMON. S.D. McCormick and H.A. Bern. University of California, Berkeley.

To investigate the in vitro hormonal control of gill  $\text{Na}^+, \text{K}^+$ -ATPase (the sodium pump) in coho salmon, a technique for the culture of primary gill filaments for up to 4 days was developed. Trypan blue exclusion was greater than 99.9%, histological appearance of the cells was normal, and total  $[\text{Na}^+]$ ,  $[\text{K}^+]$ , DNA and protein content were unchanged from initial levels. In fish with initially low gill  $\text{Na}^+, \text{K}^+$ -ATPase activity (pre-smolts), cortisol (0.1, 1.0 and 10.0  $\mu\text{g/mL}$ ) caused a significant, dose-dependent increase in gill  $\text{Na}^+, \text{K}^+$ -ATPase activity over initial and control levels after 4 days in culture. In fish with initially high gill  $\text{Na}^+, \text{K}^+$ -ATPase activity (post-smolts), cortisol partially prevented the decline in activity which occurred through 4 days of culture. The relative ability of steroids to increase gill  $\text{Na}^+, \text{K}^+$ -ATPase activity was: dexamethasone > cortisol = 11-deoxycortisol > cortisone. Insulin (0.1, 1.0 and 10.0  $\mu\text{g/mL}$ ), alone or in combination with cortisol, had no effect on gill  $\text{Na}^+, \text{K}^+$ -ATPase activity. Scatchard analysis of [ $^3\text{H}$ ]ouabain binding to gill tissue showed that cortisol treatment significantly increased  $B_{\text{max}}$  of  $\text{Na}^+, \text{K}^+$ -ATPase, but not  $K_d$ . Supported by NSF, NIH and Sea Grant.