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The effects of changes in extracellular calcium concentrations on the electrical properties of command neurons after acquisition of a defensive conditioned reflex in snails

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Abstract

Studies of the electrical characteristics of the command neurons of a defensive reflex showed that the membrane potential showed no significant changes in response to changes in the calcium concentration in the perfusing solution in either intact or trained snails. Increases in the calcium ion concentration in intact snails were accompanied by increases in the threshold potential, from 14 ± 0.7 mV at 2.5 mM Ca^{2+} to 21.8 ± 0.9 mV at 20 mM Ca^{2+} . The threshold potential in trained snails decreased in response to both increases and decreases in calcium concentrations, from 16.8 ± 0.6 mV (physiological saline containing 10 mM Ca^{2+}) to 13.3 ± 0.6 mV at 20 mM Ca^{2+} and 11.8 ± 0.8 mV at 2.5 mM Ca^{2+} . The critical depolarization level changed correspondingly: in intact snails, this decreased with increases in calcium concentration, while in trained snails it increased in response to both increases and decreases in the calcium concentration. © 2006 Springer Science+Business Media, Inc.

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Keywords

Calcium, Excitability, Learning, Membrane potential, Snail, Threshold potential