February 07, 2016
Sim 2
Extracellular recording
Crayfish Nerve Recording

Lab Animal Welfare Question due Friday, Feb 12

Sim 2

No C in space constant

Suction Electrode
Amplifier

Extracellular
fluid

V = IR

Model Systems in Neuroscience
Large and identified neurons
Small neural networks

Introduction to lab exercise for this week
Crayfish abdominal morphology

Membrane AP to amplifier output

How do we apply Ohm’s law?

Axon

Extracellular
fluid

Amplifier

Summary

Ohm’s Law
V = IR

Axon

Extracellular
fluid

Amplifier

Differential amplifier
Common mode rejection
For noise reduction

To Oscilloscope/Computer

Electrode metals

Bad: Al, Ch, Ti---metal oxide
layer (low Ca)
Ag, Cu toxic in longer term

Good: Gold, SS, Pt—little or no oxide layer

AP current flows across membrane
resistance, powered by resting potential

Resistance generates AP voltage change

Voltage change causes current
flow across metal electrodes

Amplification of current flowing across amplifier input resistance

AP current flowing across saline
Resistance generates AP voltage change

“Flow” across metal electrodes

V = IR

AP current

Voltage change

Resistance

Current flow

Metal electrodes

Figure A1. Abdominal mesoderm. A. Ventral view indicating the plane of section. B. Cross-section of abdomen, showing the main muscle groups.
Key references for this week's lab:
- Kennedy and Takeda, 1964b
- Wine et al, 1974
- Larimer and Moore, 2003
- Atwood, 2008

Motor Network in VNC (Like spinal cord)
Alive with reflex activity

Methylene blue stain of abdominal nervous system

Single unit analysis: reflex firing of individual axons of different diameters.

- Spontaneous activity of nerve 3
- Stimulate tail fan
- Move swimmerets

Example student data (last century)

Example student data
Sorting spikes

Goals for lab this week:

- How many AP classes?
- Any patterns of activity in total or individual AP activity?
- Break down firing activity of different axons.
- Document activity in different sensory stimulation conditions.
- Activity change due to other reasons? (time, temperature)
- Is size of AP related to conduction time?

Make sure the computer is making sense. Check AP sizes on Oscilloscope too. Trigger off one AP and see what else shows up around it. Use the real time monitoring to verify different AP shapes.