

Measuring action potentials via suction electrode in animal ganglia

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Abstract

A significant amount of work has been published using crayfish as a model organisms for neurophysiological teaching and research.

Research Objectives

- Investigating the core concepts of electrophysiology
- Preliminary construction of data acquisition apparatus for nerve signal research using crayfish as a model organism
- Establishment of a research program to propel undergraduate students towards their transfer institutions

Acknowledgments

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Methods

Specimen: Crayfish; *Procambarus clarkii* were obtained by USDA permit from Carolina Biological Supply, North Carolina

Anesthetics & Conduction solution:

- 10% ethanol solution; crayfish were also placed in an ice bath for 5-10 minutes
- Van Harreveld's saline solution

Suction Electrode & Electronics:

- A rudimentary suction electrode was constructed from a 1 mL syringe, silver wire, micropipette tip, stop cock, and a 3 mL syringe.
- The electrode was connected directly to a TEK TDS 2000C series oscilloscope.

Dissection: A cut was made at the top of the abdomen below the cephalothorax; exoskeleton was removed to expose nerves

Recording: Negative pressure was used to suck the nerve end near the silver wire. Spontaneous impulses from the nerve were then shown on the oscilloscope as slight spikes in activity.

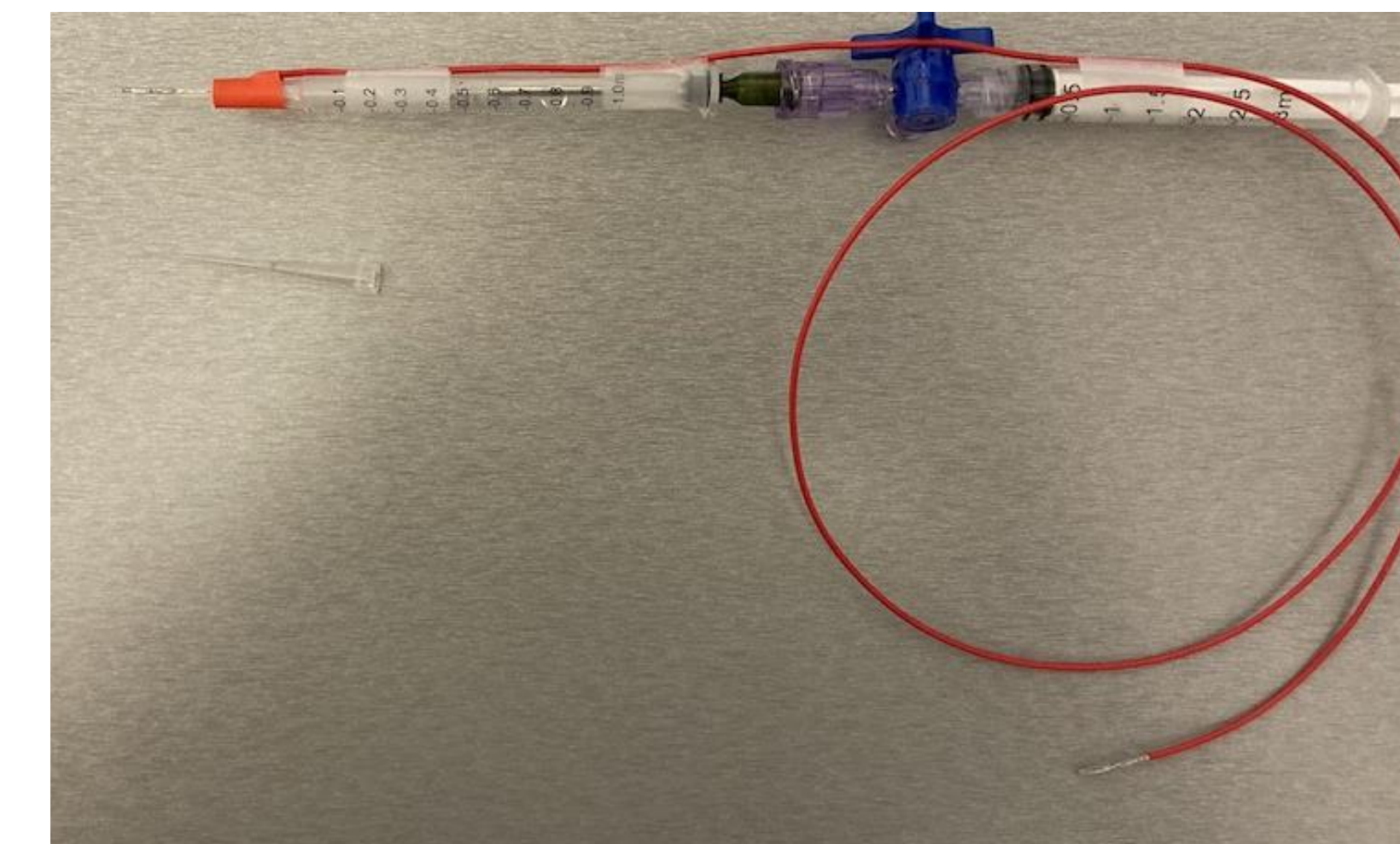


Fig 1. Rudimentary Suction electrode

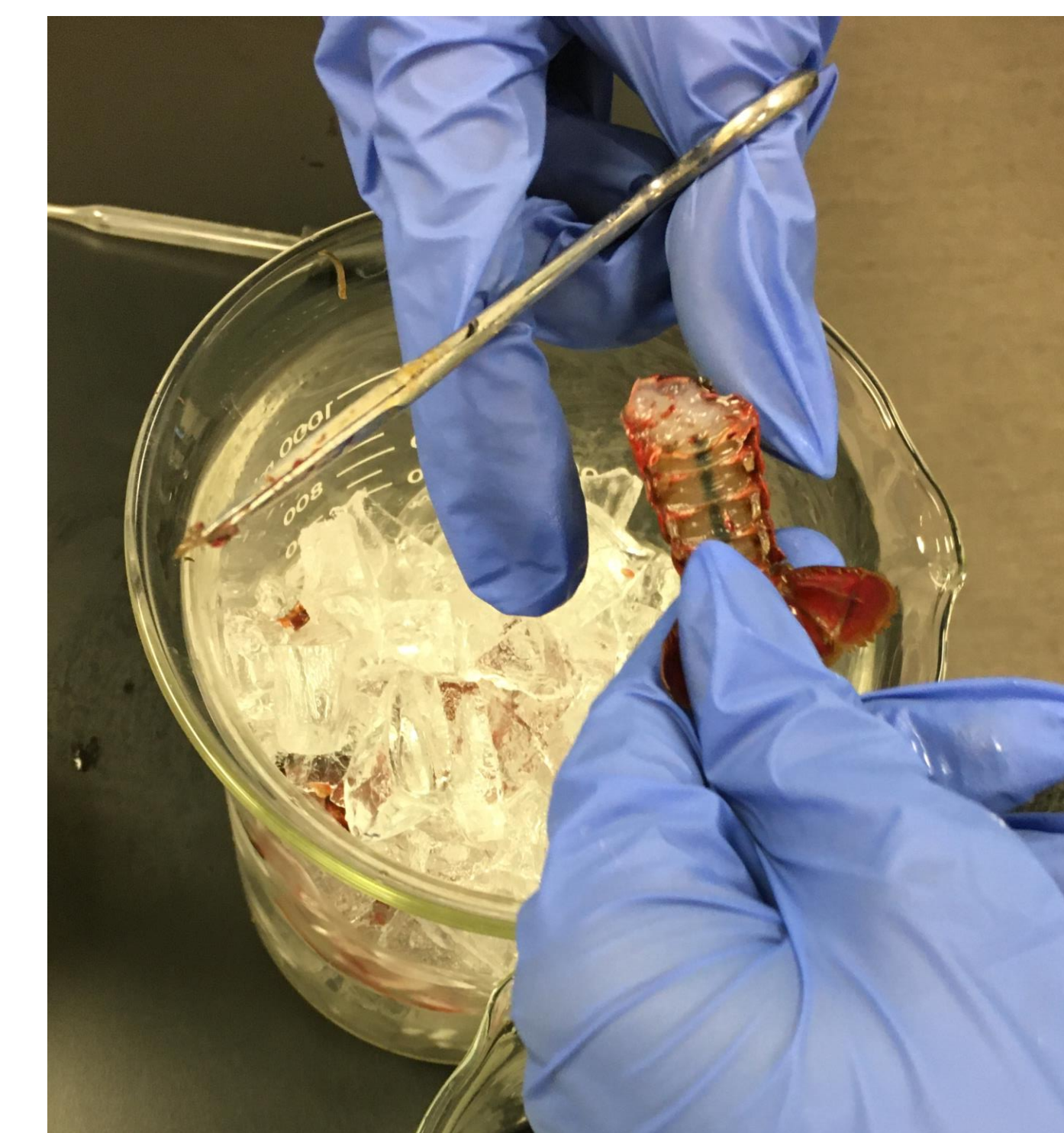


Fig 2. abdomen section of crayfish.

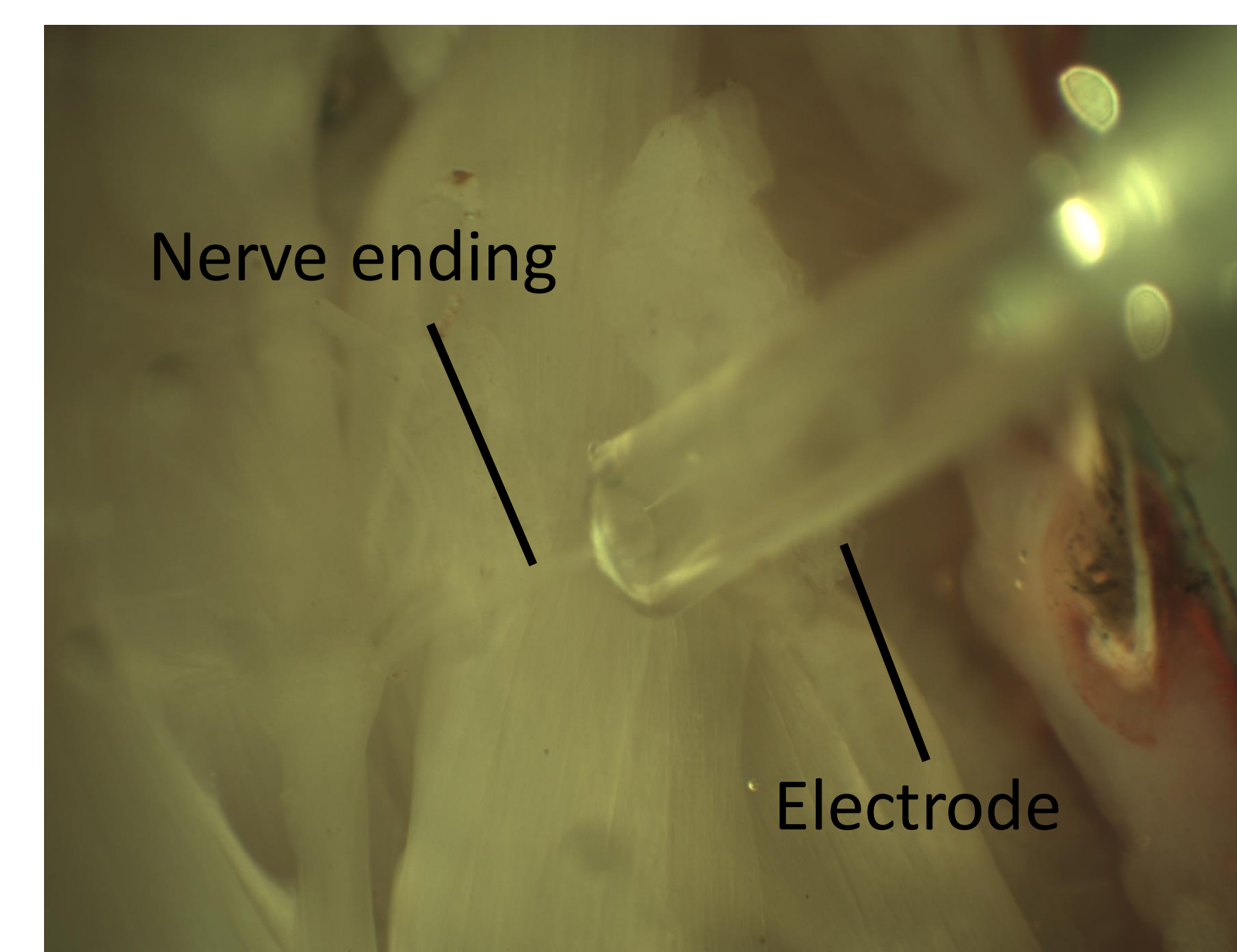


Fig. 3 Suction electrode near nerve tissue.

Conclusion

Specimen:

- Earthworms or cockroaches are more accessible may provide higher-quality data
- Wait until it is crayfish season locally

Suction electrode:

- Pure, solid silver wiring needed
- Better grounding system to reduce noise
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Electrophysiology equipment

- Faraday cage to reduce environmental noise
- More refined acquisition system

Future Directions:

- Anesthetics & Drug research
- Neural learning
- Bioindicator

References

Olivo, R.F. *Lab 7: Motor Units in the Crayfish Nerve Cord*. Smith College. March 23, 2015.

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