





## Figures

Figure 1. The cardiac ganglion of the *Homarus americanus* contains 4 small cells and 5 large cells. The small cells (purple) are premotor neurons that drive bursting patterns of large cells. The large cells (green) are motor neurons that drive heart muscle activity. A ligature placed anterior to large cell 4 decouples small and large cells for individual bursting recordings. The circled purple and green ovals indicate recording sites for, respectively, small cells in the trunk and the large cells in the anterolateral nerve.

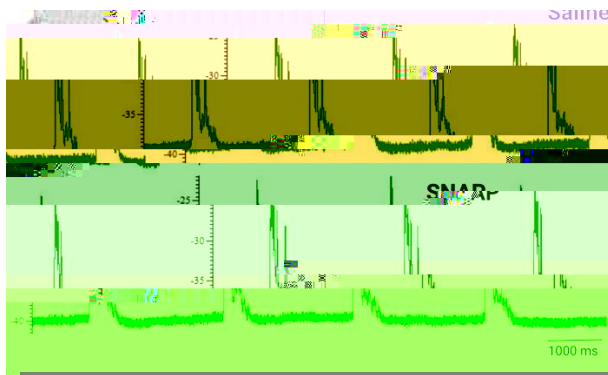


Figure 4. Model of two-electrode voltage clamp recording of the effects of SNAP on one of the large cells. Intracellular recordings indicate SNAP application decreases burst frequency but has no clear effect on burst duration. The interburst interval may be increased due to an increased hyperpolarizing current or decreased depolarizing current.

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### References

- Cooke, I. M. (2002). Reliable, responsive pacemaking and pattern generation with minimal cell numbers: The crustacean cardiac ganglion. *The Biological Bulletin*, 202(2), 108-136. doi:10.2307/1543649
- Dickinson, P. S. (2006). Neuromodulation of central pattern generators in invertebrates and vertebrates. *Current Opinion in Neurobiology*, 16(6), 604-614. doi:https://doi.org/10.1016/j.conb.2006.10.007
- Mahadevan, A., Lappé, J., Rhyne, R. T., Cruz-Bermúdez, N. D., Marder, E., & Goy, M. F. (2004). Nitric oxide inhibits the rate and strength of cardiac contractions in the lobster *Homarus americanus* by acting on the cardiac ganglion. *The Journal of Neuroscience : the official journal of the Society for Neuroscience*, 24(11), 2813–2824. https://doi.org/10.1523/JNEUROSCI.3779-03.2004
- Scholz, N.L., Labenia, J.S., De Vente, J., Graubard, K. and Goy, M.F. (2002), Expression of nitric oxide synthase and nitric oxide sensitive guanylate cyclase in the crustacean cardiac ganglion. *J. Comp. Neurol.*, 454: 158-167. <https://doi.org/10.1002/cne.10442>