Appendix of Figures

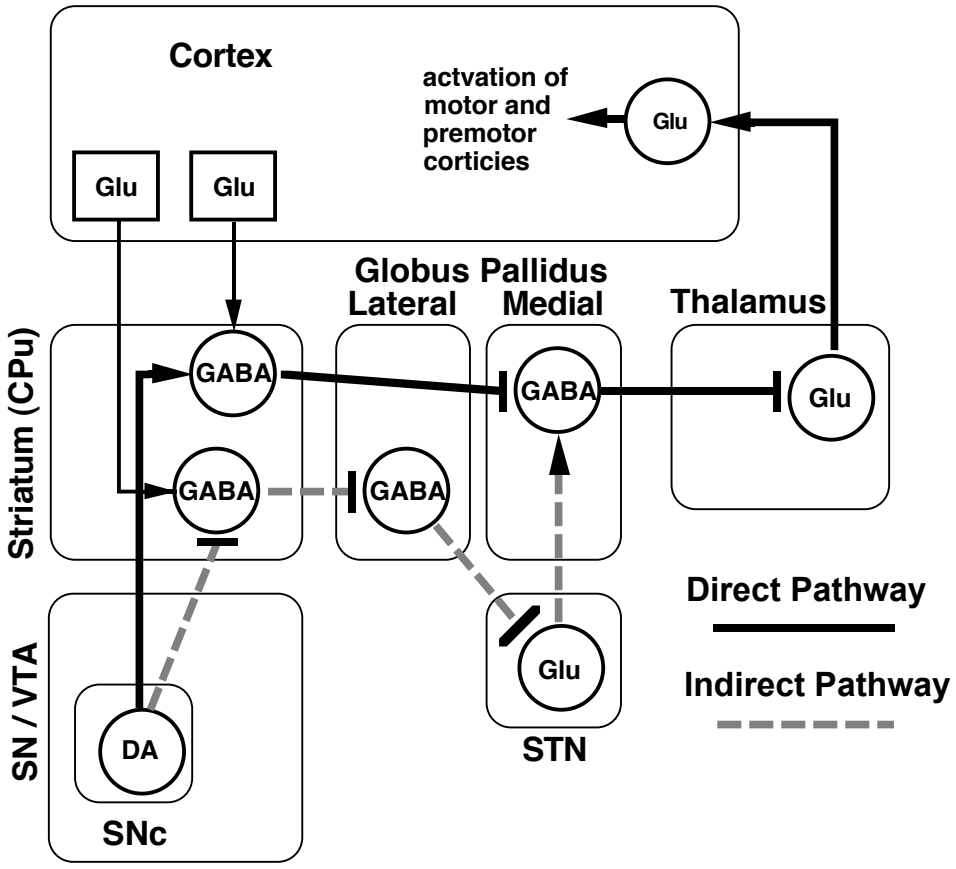
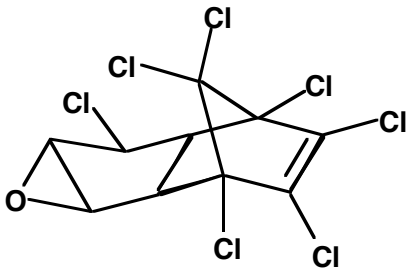
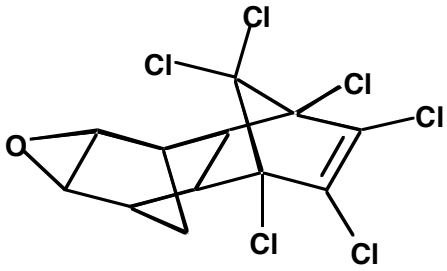


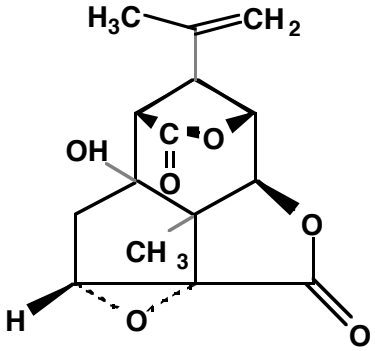
Fig. 1-1. Schematic diagram of the Basal Ganglia. Excitatory projections are represented by arrows, and inhibitory projections are represented by blunted bars. The direct pathway to the thalamus is indicated by the bold line and the Indirect pathway is represented by the dashed line. The pathway between the globus pallidus and the thalamus is shared by both indirect and direct pathways. Abbreviations are as follows: CPu, Caudate Putamen; SNc, Substantia Nigra pars compacta; VTA, Ventral Tegmental Area; STN, Subthalamic Nucleus; Glu, glutamatergic projections; DA, dopaminergic projections; D_1, D_1 receptors mediating inhibitory striatal dopaminergic synapses of the indirect pathway; GABA, GABAergic projections. Adapted from Purves et al., (1997).



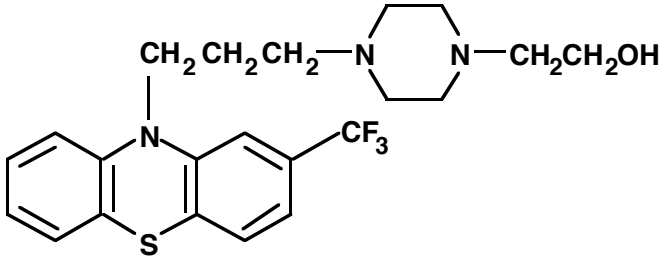
HEPTACHLOR EPOXIDE



DIELDRIN



PICROTOXININ



FLUPHENAZINE

Fig. 1-2 Compounds used in the present study

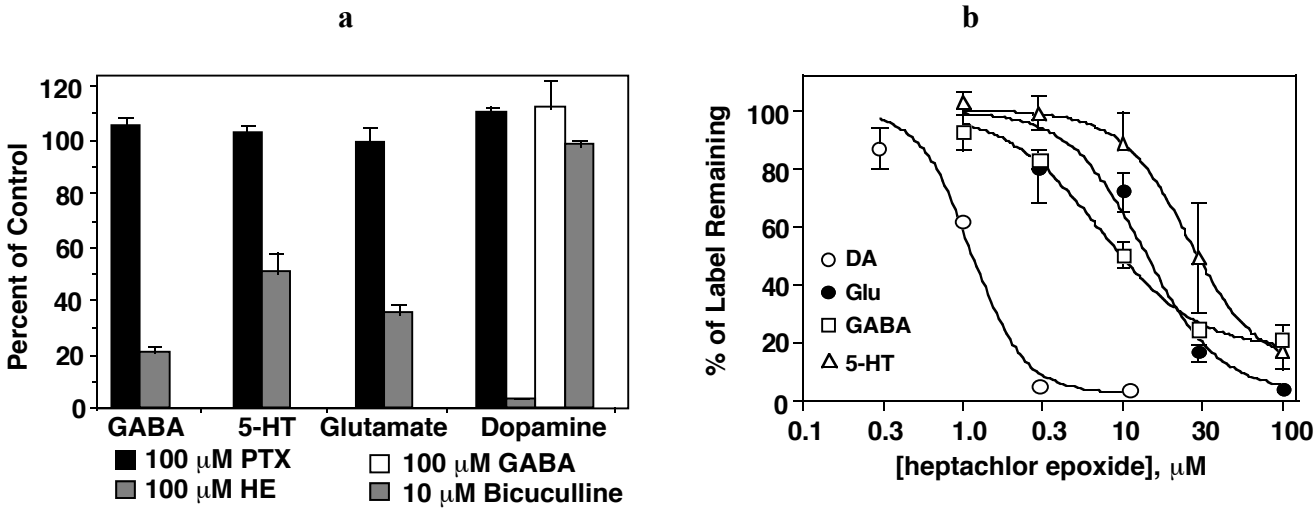


Fig. 1-3 Effects of heptachlor epoxide and $GABA_A$ receptor-directed compounds on neurotransmitter release (a) and comparative potency for heptachlor epoxide to release various neurotransmitters (b). Synaptosomes were made from striatum (dopamine) or cortex (all other neurotransmitters), loaded with radiolabeled neurotransmitter and treated with the listed compounds. The radiolabel remaining following treatment is represented on the y-axis of each figure. Taken from Kirby *et al*. (1997).

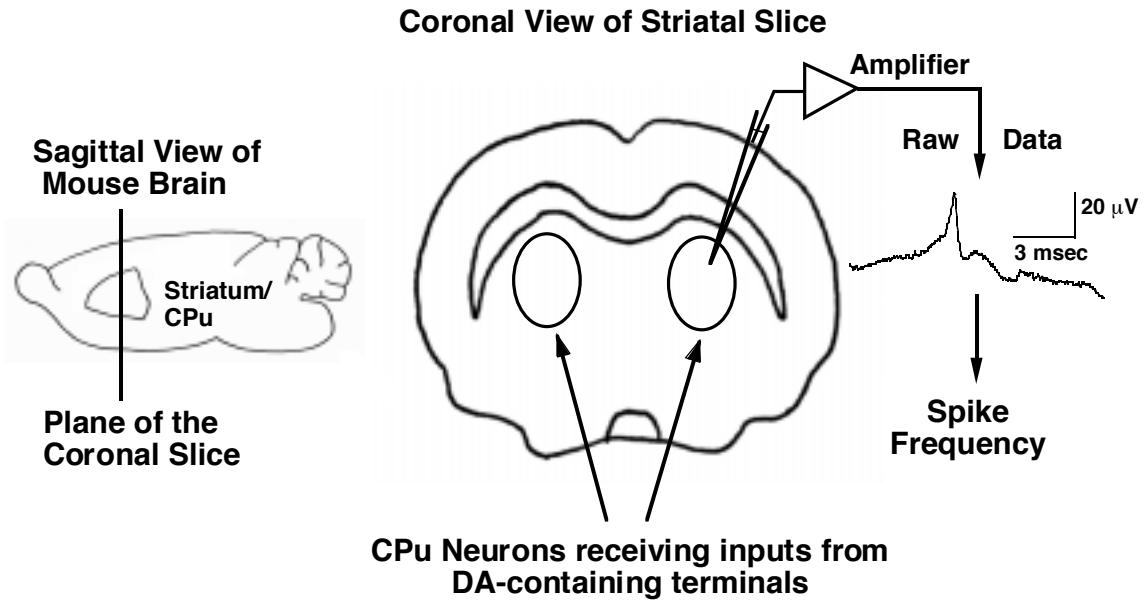


Fig. 2-1 Preparation of slices and experimental setup used for extracellular recording of neurons within the caudate putamen.

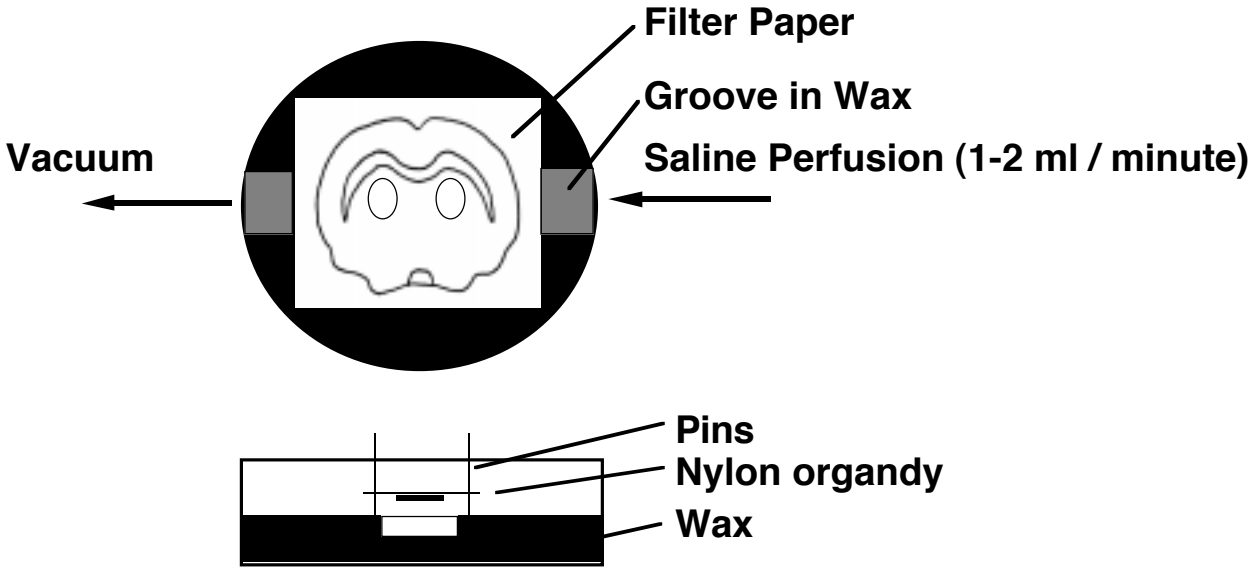


Fig. 2-1b Brain slice recording chamber

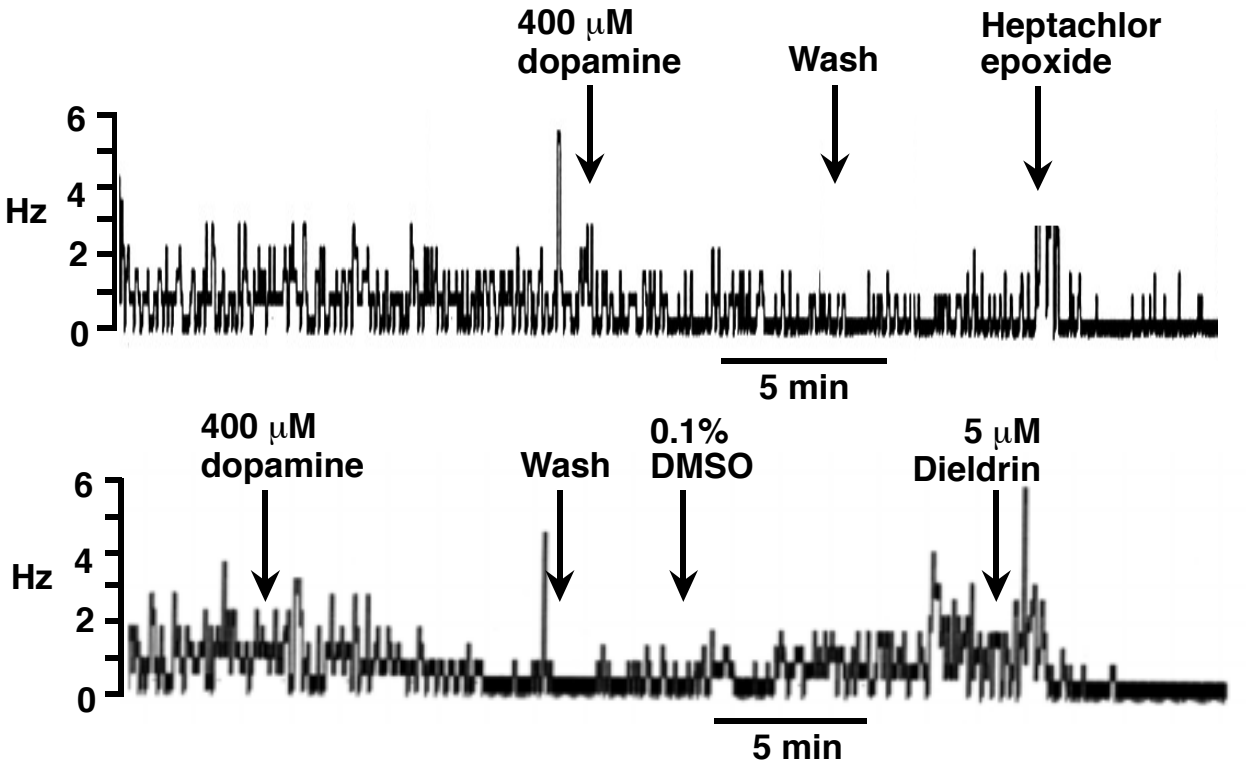


Fig. 2-2 Heptachlor epoxide and dieldrin (5 μM) reduce firing frequency within putative striatal indirect pathway neurons. The apparent increase in firing frequency at HE application is an artifact of drop-on treatment.

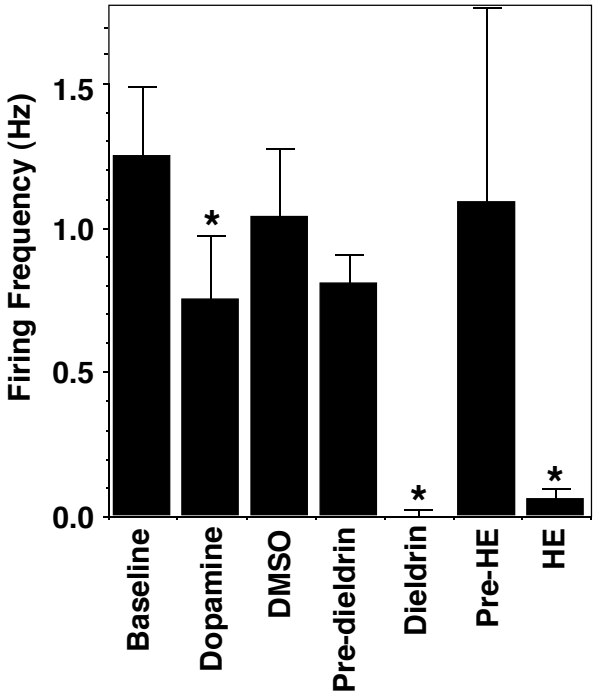


Fig. 2-3. Summary of cyclodiene trials. A marked inhibition of firing activity within striatal neurons was seen following treatment with dieldrin (5 replicates) and heptachlor epoxide (3 replicates). Bars marked with asterisks indicate significant effect of dopamine compared to baseline, dieldrin compared to pre-dieldrin, and HE compared to Pre-HE.

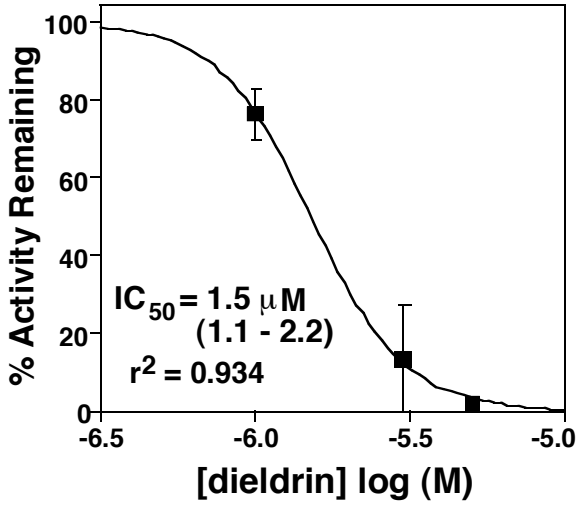


Fig. 2-4 - Dieldrin causes suppression of firing in striatal neurons in a dose-dependent fashion.

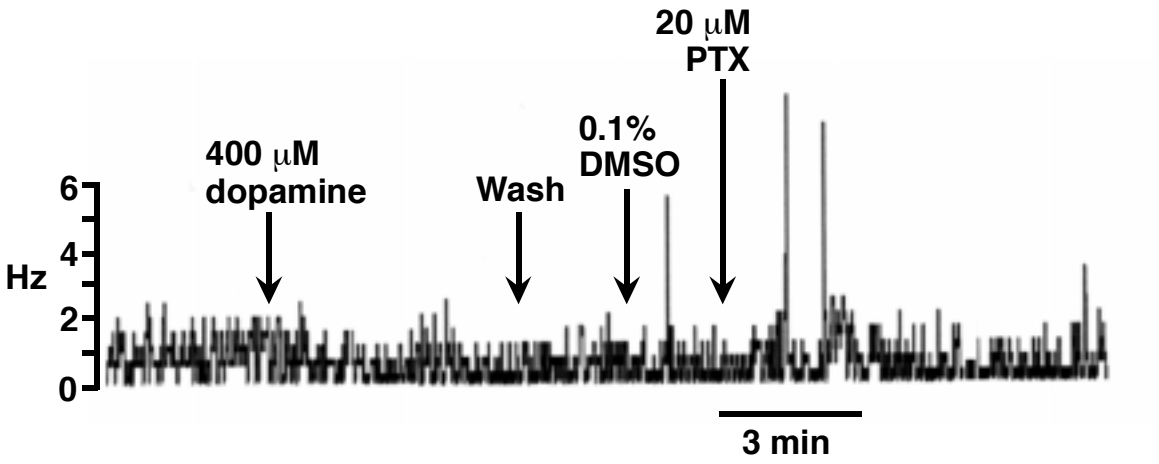


Fig. 2-5 Exposure to PTX elevated the firing rates of striatal neurons.

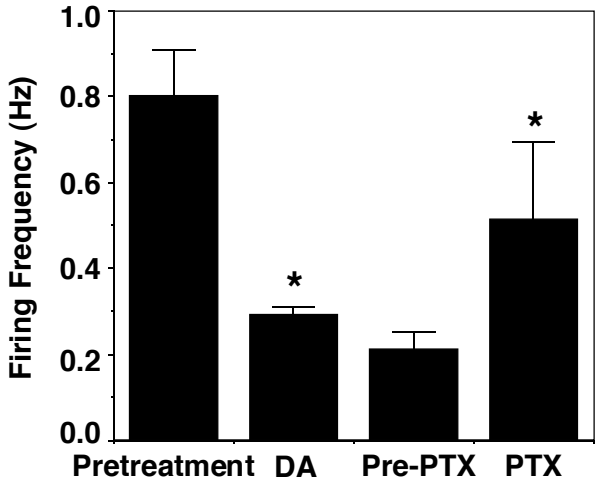


Fig. 2-6. Summary of five PTX trials. PTX (20 μM) was found to cause excitation within striatal neurons. Asterisks indicate a significant reduction of firing by dopamine and an increase in firing by PTX.

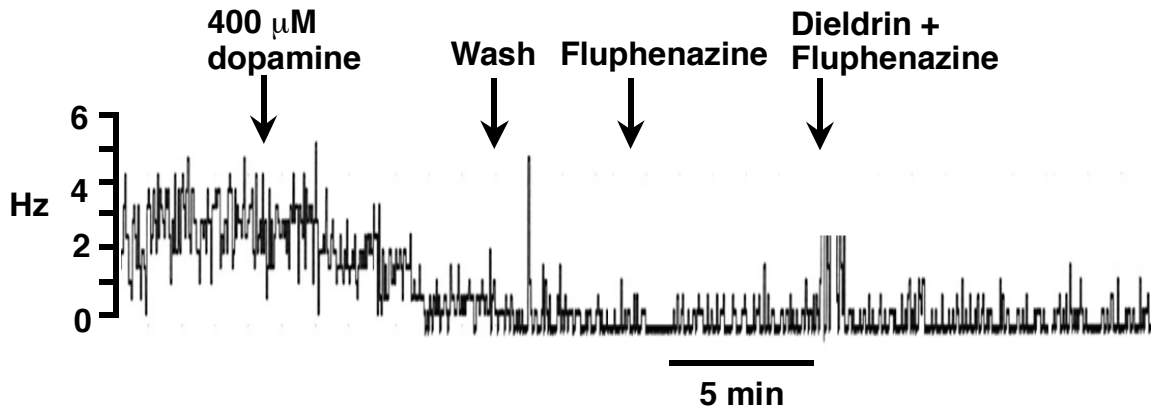


Fig. 2-7 - Exposure to dieldrin following a five minute perfusion of the dopamine antagonist, fluphenazine (20 μM), was not found to cause a significant depression of firing within indirect-pathway neurons. The apparent increase in firing frequency at dieldrin application is an artifact of drop-on treatment.

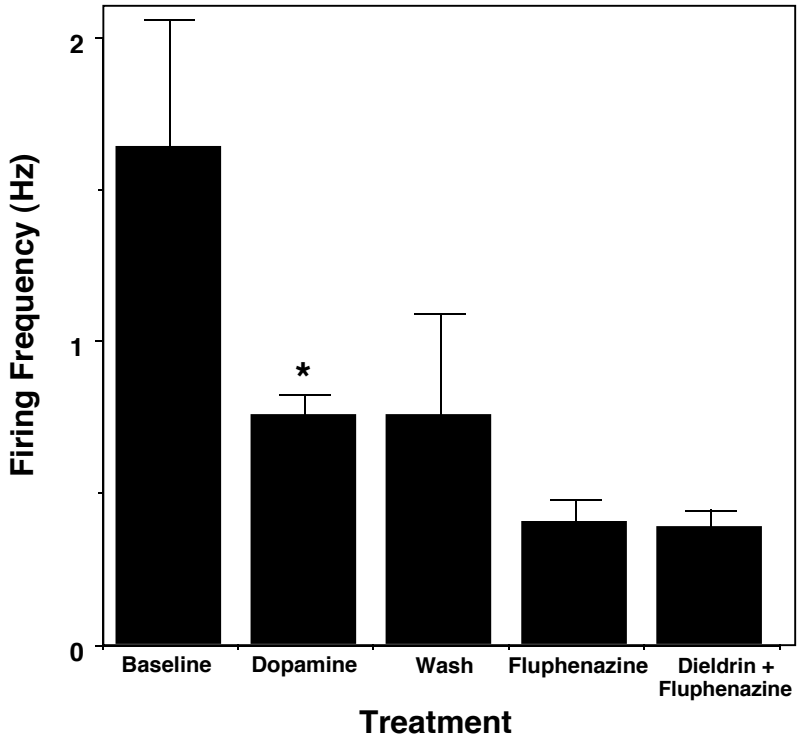


Fig. 2-8. Summary of data collected from three slices treated with fluphenazine. Following a 5 minute fluphenazine wash (20 μM), dieldrin (5 μM) was applied to the slice. No statistical difference was found between the measurements of firing frequency, following dopamine washout, and the firing frequency recorded following the treatment with 5 μM dieldrin. Asterisk denotes a significant reduction in neuronal discharge by dopamine.

Vita

Ethan R. Freeborn

Ethan R. Freeborn was born in Indianapolis, Indiana on March 13, 1974. He is the son of Dennis and Ingrid Freeborn of Rocky Gap, VA. Ethan graduated from Virginia Polytechnic Institute and State University (Blacksburg, VA) magna cum laude in December of 1996. He received a B.S. in Biochemistry with a minor in Chemistry and a B.A. in Psychology. Ethan worked from 1997 to 1999 with Dr. Jeffrey R. Bloomquist in the Department of Entomology, also at VPI. This volume represents the work undertaken during his period of master's research. Ethan is a member of the Society for Neuroscience, and the honor fraternities Phi Kappa Phi and Phi Beta Kappa. After receiving his M.S. in the life sciences, Ethan anticipates entering into a medical program in the Fall of 2000.