Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Simulation of dendritic growth reveals necessary and sufficient parameters to describe the shapes of dendritic trees. OLIVIER TROTTIER, SUJOY GANGULY, HUGO BOWNE-ANDERSON, Yale University, XIN LIANG, Tsinghua University, JONATHON HOWARD, Yale University — For the last 120 years, the development of neuronal shapes has been of great interest to the scientific community. Over the last 30 years, significant work has been done on the molecular processes responsible for dendritic development. In our ongoing research, we use the class IV sensory neurons of the *Drosophila melanogaster* larva as a model system to understand the growth of dendritic arbors. Our main goal is to elucidate the mechanisms that the neuron uses to determine the shape of its dendritic tree. We have observed the development of the class IV neuron's dendritic tree in the larval stage and have concluded that morphogenesis is defined by 3 distinct processes: 1) branch growth, 2) branching and 3) branch retraction. As the first step towards understanding dendritic growth, we have implemented these three processes in a computational model. Our simulations are able to reproduce the branch length distribution, number of branches and fractal dimension of the class IV neurons for a small range of parameters.

Olivier Trottier
Yale Univ

Date submitted: 06 Nov 2015 Electronic form version 1.4