# Chapter 1

# Introduction:

# Groucho – A Multifunctional Regulator of Drosophila Development

## Introduction

The Groucho/TLE (Gro) family of of corepressors play crucial roles in development throughout metazoans. Groucho, the sole *Drosophila melanogaster* member of this protein family, was first discovered in the context of a slight hypomorphic allele which resulted in the formation of extra supraorbital bristles reminiscent of the bushy eyebrows of Groucho Marx {Lindsley, 1968 #3055}. Subsequent research on Gro in *Drosophila* has served to characterize this factor’s central importance to developmental gene regulation in response to a variety of developmental programs and signaling pathways. As a corepressor, Groucho has no documented direct ability to bind DNA in a sequence-specific manner, instead relying on recruitment to genomic loci through interaction with a diverse array of transcriptional repressors. Groucho is essential to the correct patterning and development of *Drosophila* and is required for viability. Similar roles have been identified in vertebrates {Paroush, 1994 #172}.

Groucho consists of five domains, two of which are highly conserved {Turki-Judeh, 2012 #2385}. The N-terminal Q (glutamine rich) domain is one of the two conserved domains. The Q domain is responsible for the formation of tetramers, and possibly higher-order oligomers of Gro {Chen, 1998 #267}. Additionally, the Q domain mediates a subset of interactions with transcriptional repressors, including the TCF/Lef family of proteins {Brantjes, 2001 #3058}. Assays involving Grg3, a mouse homolog of Gro, on *in vitro* chromatin arrays showed that Q domain mediated tetramerization is not required for recruitment of Gro to chromatin, but is required for subsequent aggregation of chromatinized fragments. However, assays in cell culture revealed that oligomerization-deficient mutants of Gro exhibited similar patterns of chromatin localization as wild-type Gro {Kaul, 2014 #2204}.