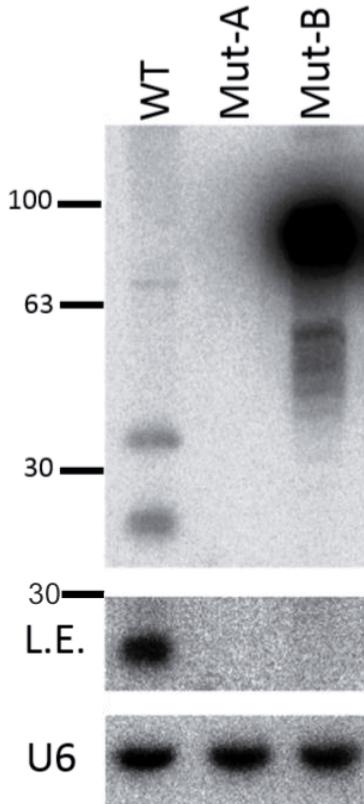


7.342: The RNA Revolution: Midterm Assignment

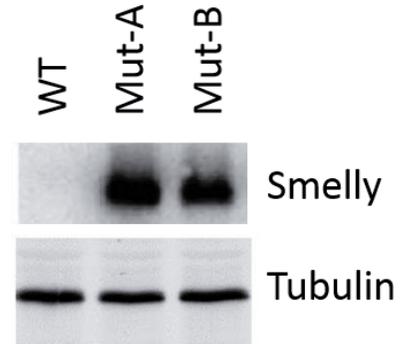


You are maintaining multiple stocks of *C. elegans* worms in Bob Horvitz lab. Each of these stocks carries random mutations and deletions throughout the worm genome, with roughly one significant change in each worm stock. One day, there is a noxious smell on one side of the worm room due to spillage of an ammonia cleaner by a careless Harvard student. Most of the worms crowd to the opposite side of their dish away from the smell except for two worm stocks that seem curiously drawn to the smell (Mut-A and Mut-B). Armed with your knowledge from 7.342, you map the phenotype to a 1 kb genomic region that does not contain any previously annotated genes. You design a Northern blot probe and obtain the result in Figure 1.

Figure 1 (left): Northern blot. Sizes of a molecular weight marker are shown at left. The top blot is exposed to a 1 kb probe corresponding to the entire genomic region. After obtaining the top result, you cut the blot at the 30 bp marker and expose it to film for a long time (L.E. = long exposure) with the same probe. U6 is a probe for snRNA U6 as a loading control for each lane. (Adapted from: Saito, K., et al. "Processing of Pre-microRNAs by the Dicer-1–Loquacious Complex in *Drosophila* Cells." PLOS Biology May 24, 2005. <http://dx.doi.org/10.1371/journal.pbio.0030235>. License CC-BY.)

Intrigued by this initial result, you do some investigating in the literature. You find a paper from a group at Stanford suggesting that the gene *Smelly* encodes a receptor with reactivity to high pH substances that is normally expressed early in development. The Stanford group provides you with an antibody to Smelly protein that you then use to Western blot your worms and obtain the result in Figure 2.

Figure 2 (right): Western blot. Shown at top are blotting results for Smelly, and below for Tubulin as a loading control (Adapted from: Saito, K., et al. "Processing of Pre-microRNAs by the Dicer-1–Loquacious Complex in *Drosophila* Cells." PLOS Biology May 24, 2005. <http://dx.doi.org/10.1371/journal.pbio.0030235>. License CC-BY.)



Research Proposal

How would you proceed now? Describe in three sections your thinking about the new data and propose an experimental plan for the next steps.

- 1) *Introduction*: Explain the question being addressed, your working hypothesis, and the aim/purpose of your proposed experiments.
- 2) *Methods and Experimental Design*: Design three experiments as the next steps of your research, each utilizing different techniques. Describe the methods, major reagents, experimental samples that will be collected, and the key controls (positive/negative) as needed. This is the most important section of the report.
- 3) *Results*: Summarize the possible experimental outcomes and the interpretation of the results, including the significance of the potential findings. If you find it helpful, you may include a supplementary mock figure(s) of the result (not included in the page count).

Guidelines: two to three pages, double spaced, one inch margins, Times New Roman, 11 point font

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7.342 The RNA Revolution: At the Frontiers of Cell Biology and Molecular Medicine
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