The Drosophila eye

Composed of several hundred repeating units known as ommatidia

Each ommatidium has 8 photoreceptor cells, 4 cone cells, pigment cells and a sensory bristle.

Drosophila eye development

When given a choice of light preference

Visible

UV

Drosophila prefers UV

Visible

UV

Screens for UV blind flies.

Visible

UV
UV blind flies
Defective in rhodopsin that detects UV
Missing R7
(R7 photoreceptor cell that contains UV senesitive rhodopsin)

In both sev and boss mutants, R7 is missing because it is transformed into a cone cell

If Boss is a ligand for the RTK Sevenless, then Boss’s function should be required in a cell other than R7 and Sev should be required in R7.

In 1936 Curt Stern observed twin spots $y^+\text{sn} / y\text{sn}^+$

But first a note on how mosaics were used to show how the fly eye develops.

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But first a note on how mosaics were used to show how the fly eye develops.
Analyze ommatidia at the periphery of mutant clone. These will be mosaic, containing both wild-type (red) and mutant (white) cells.

Irradiate white/+ animals and study mosaic eyes. If invariant lineage, then lineage relationships will be maintained in white clones.

If not invariant then there will be no lineage relationships among cells in clone. This is what happens! Any cell can adopt any fate. Cells are specified entirely by cell interactions.

Boss expression is restricted to R8, but Sev is expressed in R1, R3, R4, R6, R7, the precursors to the cone cells and mystery cells.

1. Does Boss function in R8 as predicted by its expression pattern?
2. Does Sev function in R7, or is signaling to the R7 cell via Sev more complex?

white can be used as cell autonomous marker to monitor the loss of sev.

sev is required in the R7 cell; it functions cell autonomously
Can use P element mediated transposition to insert *white* on other chromosomes.

\[ w/w; \text{boss/boss}^{+} P[\text{white}^{+}] \]

*boss* is required in the R8 cell; it functions cell nonautomomously

\[ w^{+}\text{boss}^{+} \quad w^{+}\text{boss}^{-} \]

\[ w^{+}\text{boss}^{+} \quad w^{+}\text{boss}^{-} \]