

# Developing the Zebrafish Neuromast Assay as a Predictive Toxicity Model

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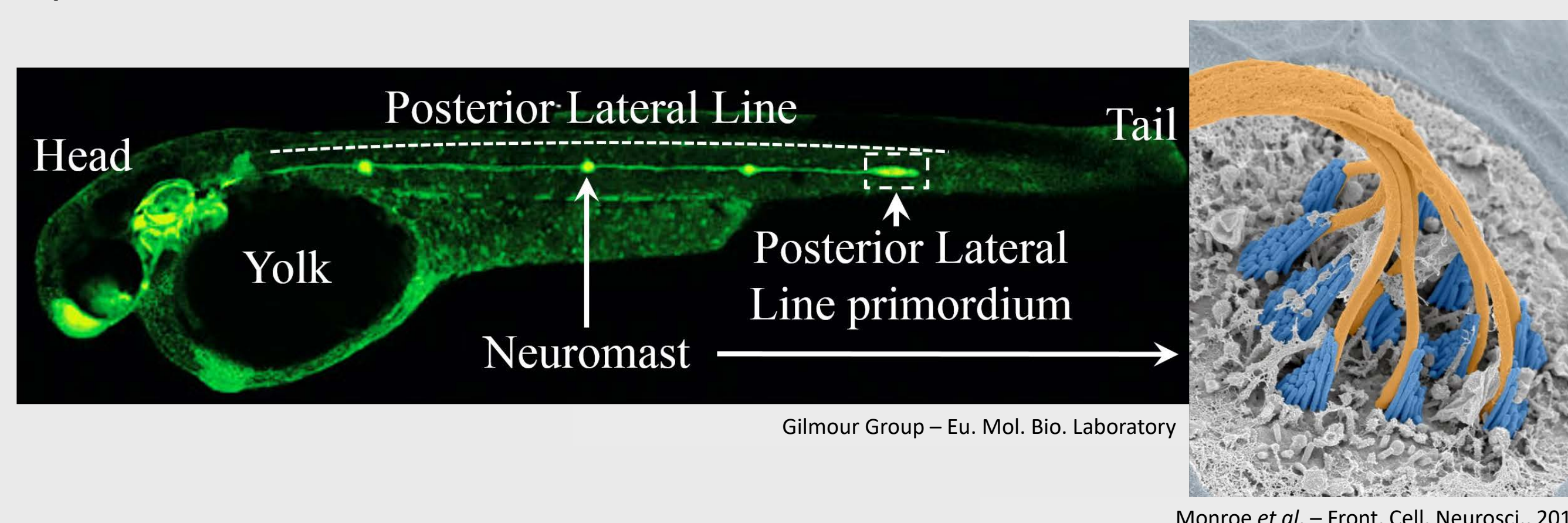
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## Introduction

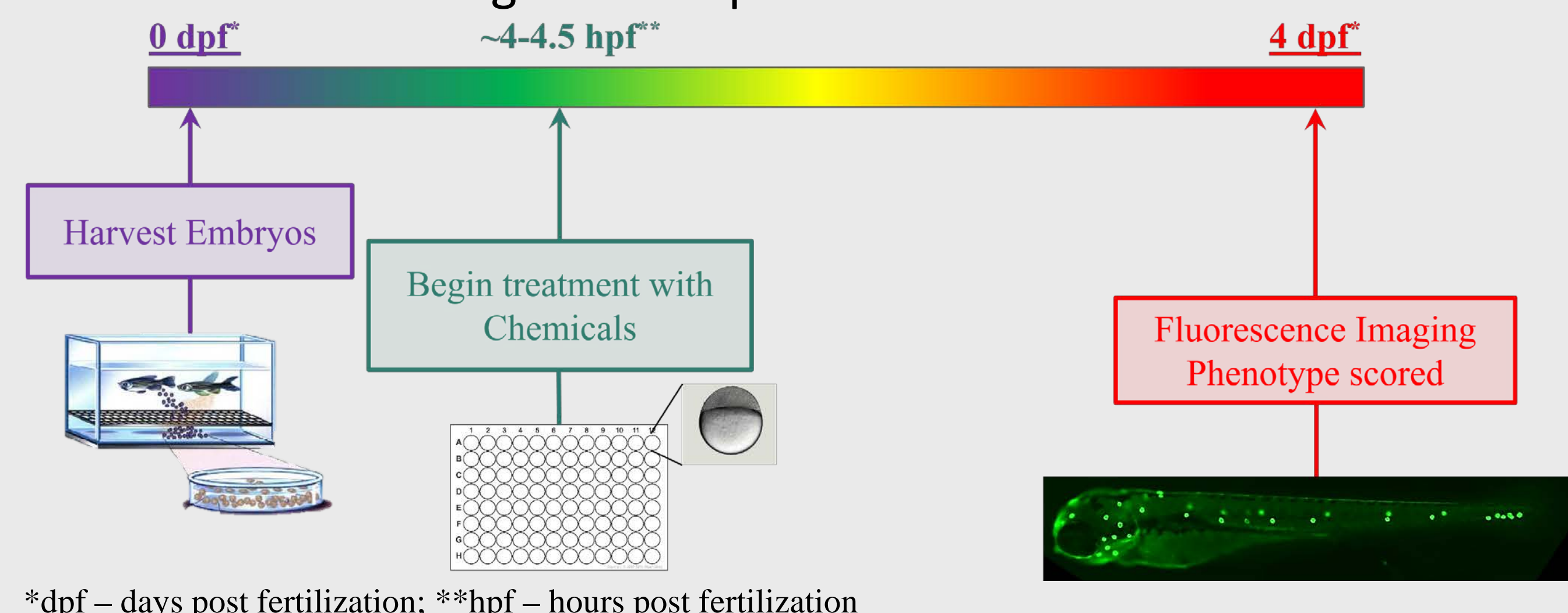
Many industrial chemicals are released into the environment every year without a full assessment of their adverse effects on human life and the ecosystem. We are in urgent need of new screening methods that are rapid and can predict toxicity across species. We aim to understand the developmental toxicity effects of some of these environmental pollutants on the zebrafish posterior lateral line which is made up of neuromasts. Zebrafish, like other fish species, use their neuromasts to sense water flow.



## Methods and Results

### High Throughput and Follow-up Screens

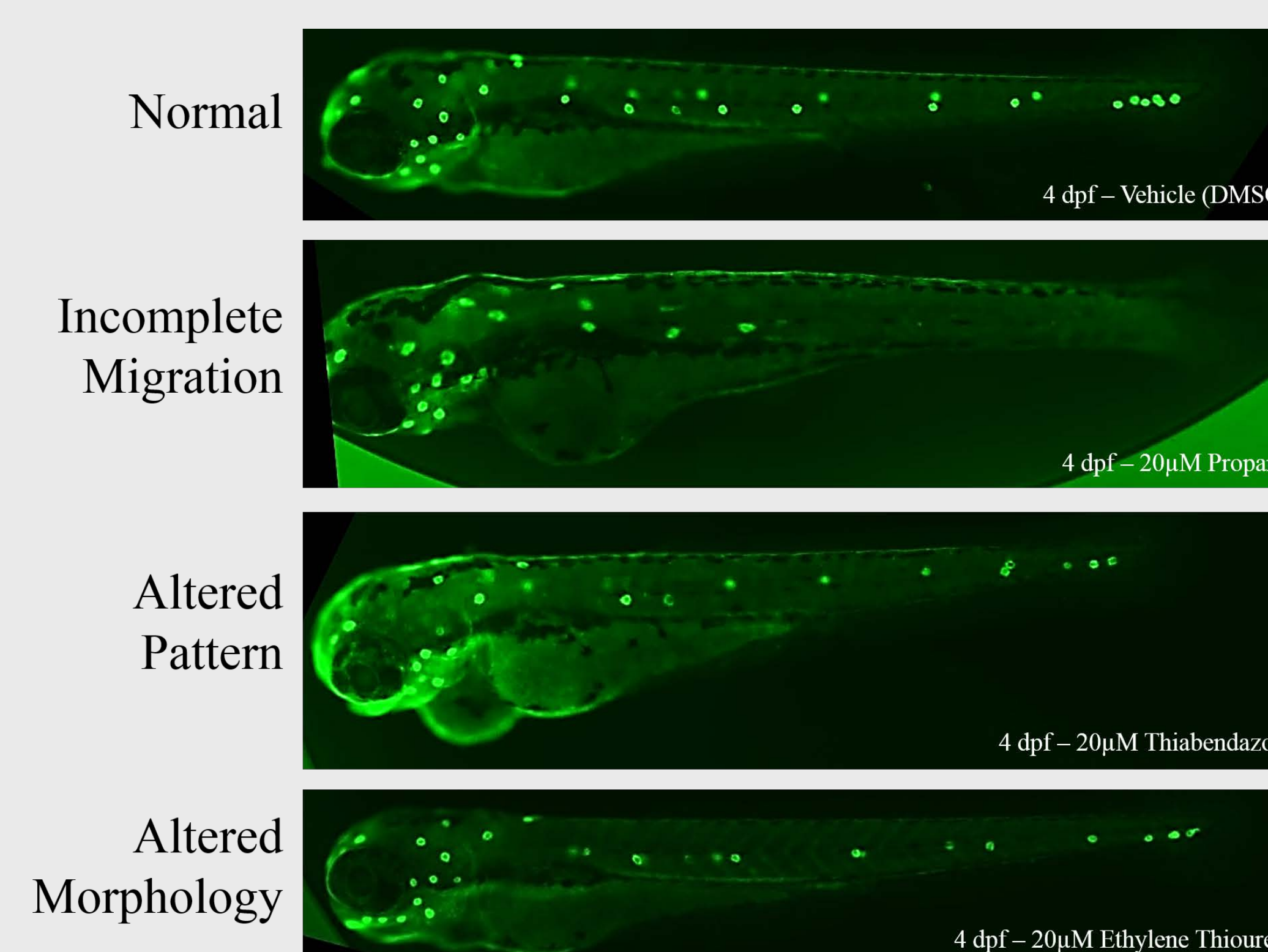
- Zebrafish embryos expressing green fluorescence in neuromasts were exposed to ~300 pesticides/antimicrobials at 3 concentrations within hours of being fertilized.
- After 4 days of exposure to the chemicals, the embryos were imaged and analyzed.
- All chemical testing was completed within 6 months.



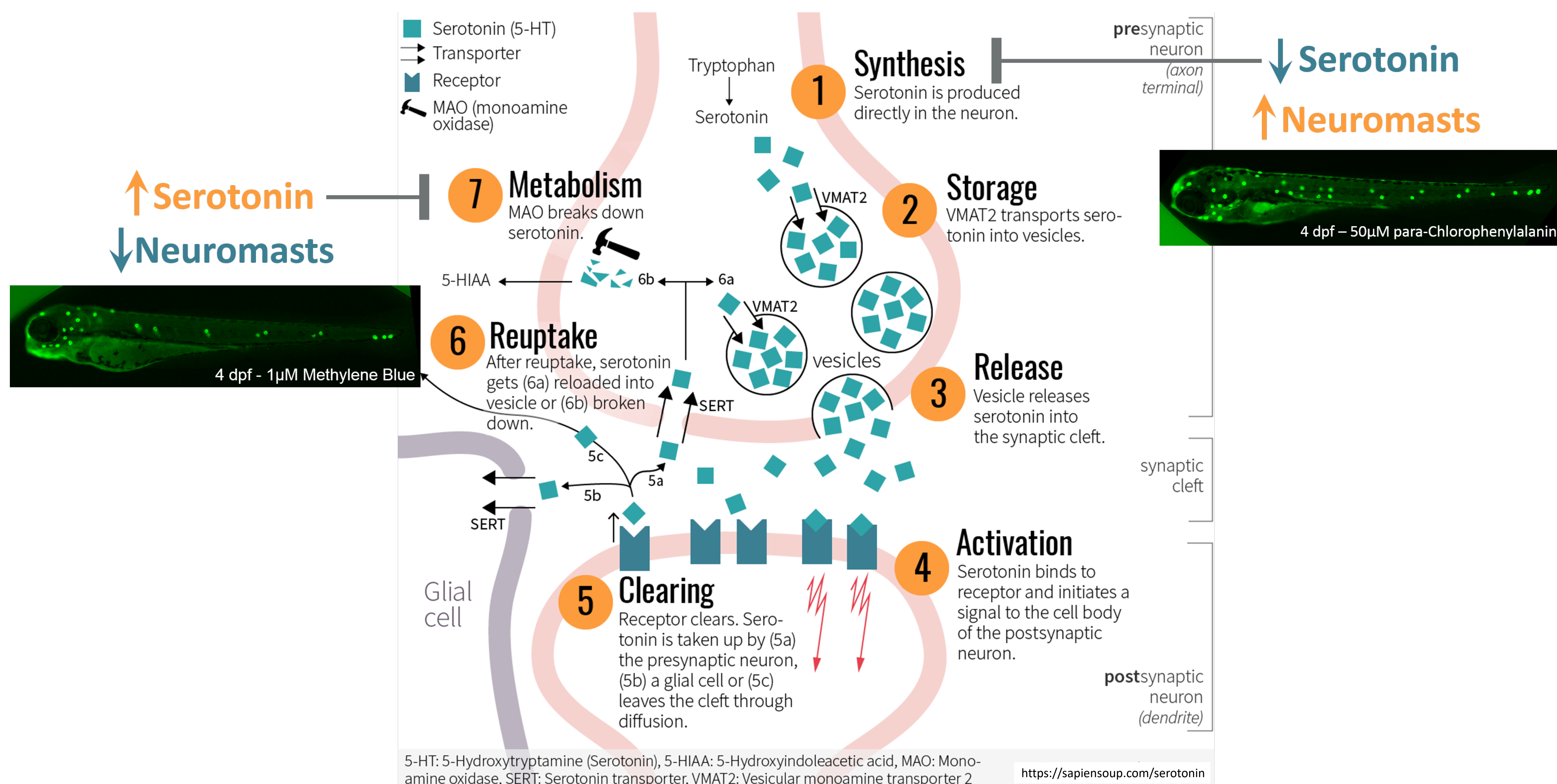
\*dpf – days post fertilization; \*\*hpf – hours post fertilization

The toxicity testing experiments resulted in a final list of 22 compounds that interfered with development of the neuromasts.

### Example Results of Toxicity Testing



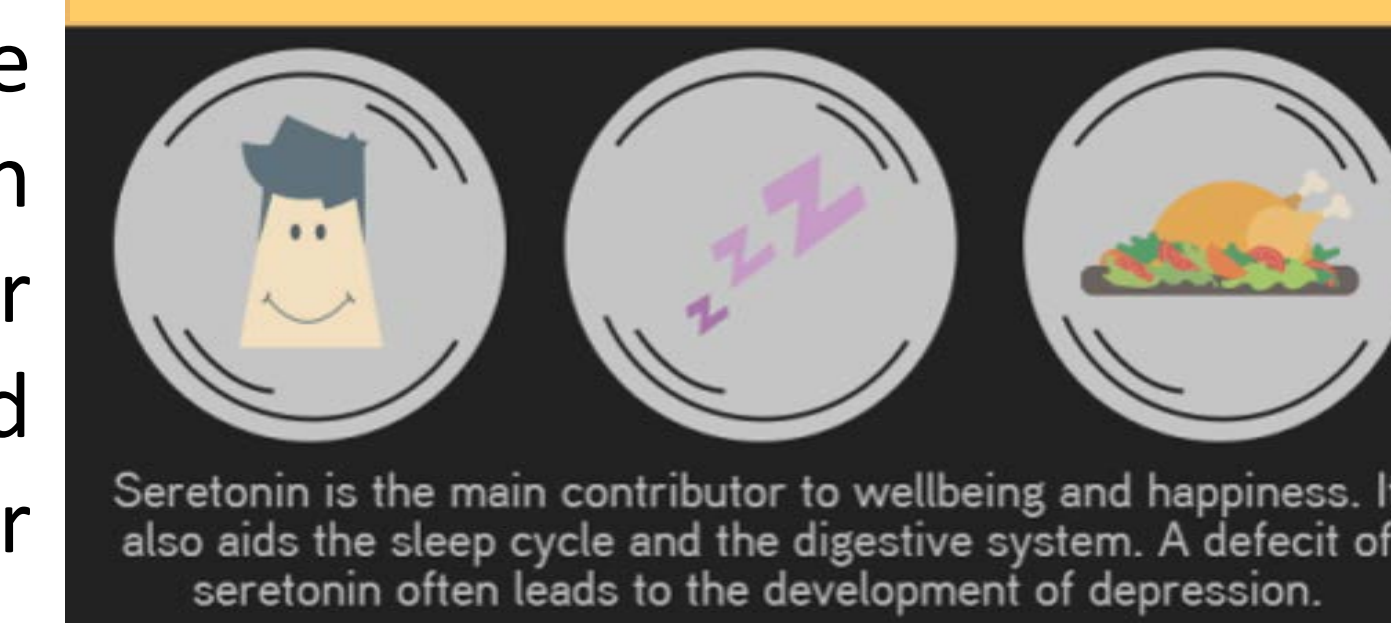
## Testing Serotonin Effectors on Neuromast Development



## Conclusions/Future Directions

- We developed a method for rapid screening of large number of chemicals to identify zebrafish neuromast disruptors.
- We identified serotonin as a possible pathway being targeted by the disruptors which we confirmed through some preliminary experiments.
- We theorize that Serotonin doesn't only regulate mood, but also plays a role in cell proliferation/motility. Our next step would be to test the newly identified serotonin effectors on different cancer cell lines to better understand the role of serotonin in cancer metastasis.

### Serotonin



<http://tobeagenius.tumblr.com/tagged/infographic>

## Acknowledgements

- This research was funded by National Institute of Health (P30ES023512).
- The transgenic fish (GW57A) were obtained from Vladimir Korzh Institute of Molecular and Cell Biology (IMCB), Singapore

## References

Gallardo, V. E. *et al.* Phenotype-driven chemical screening in zebrafish for **compounds that inhibit collective cell migration identifies multiple** pathways potentially involved in metastatic invasion. *Disease models & mechanisms* **8**, 565-576, doi:10.1242/dmm.018689 (2015)

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