

Characterization of *Botrylloides diegensis* whole-body regeneration through single-cell RNA-seq

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Department of
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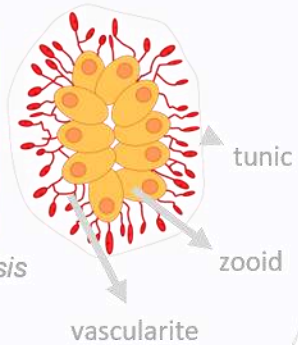
Whole-Body Regeneration

Mature colony

Tunicates are marine filter feeding chordates.



Botrylloides diegensis

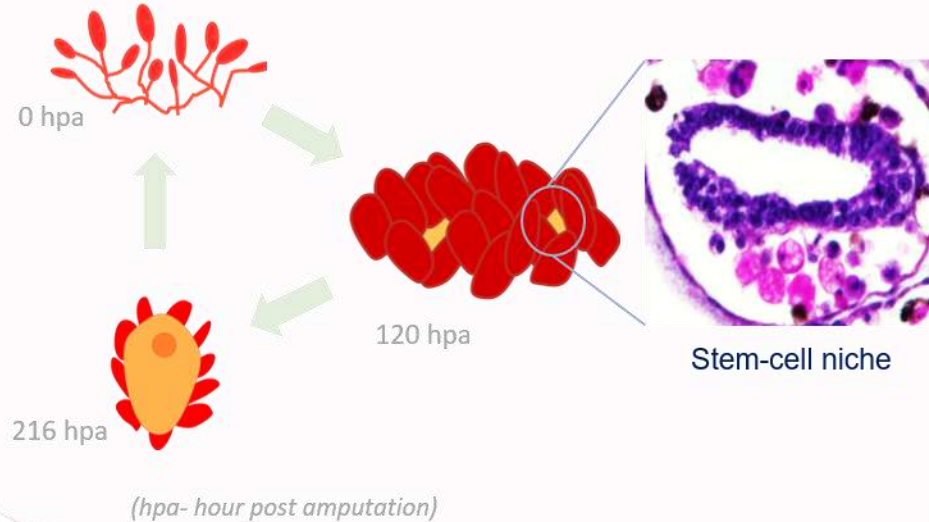


Each zooid possesses:

- Heart
- Stomach
- Intestine
- Pharynx
- Neural complex
- Gonads

The blood tissue contains at least 11 type of cell types.

Regenerating colony



Colonial tunicates can create a new functional body as little as in 8 days.

WBR in summary:

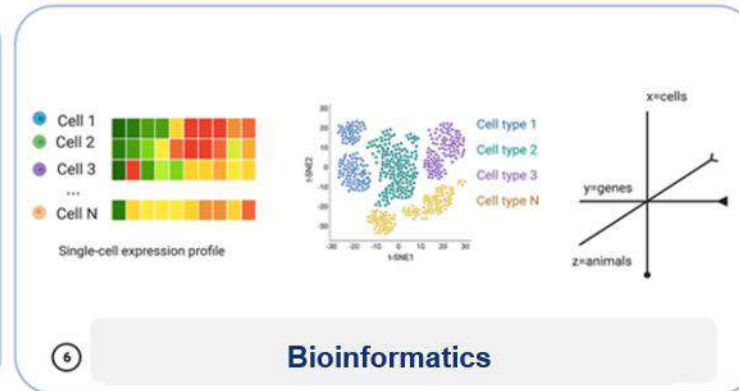
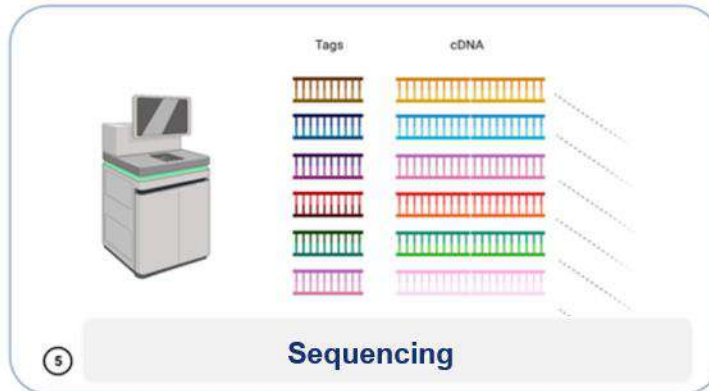
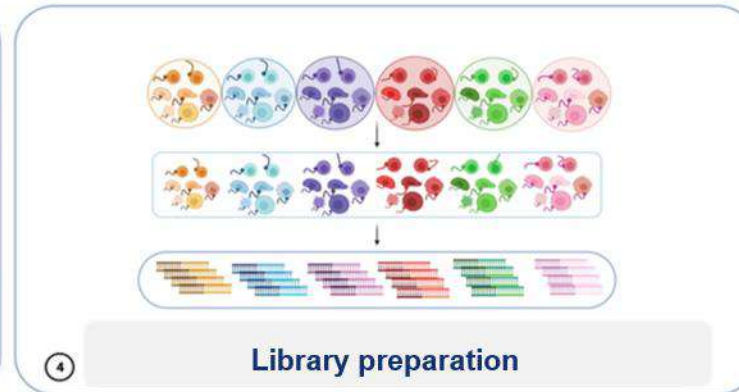
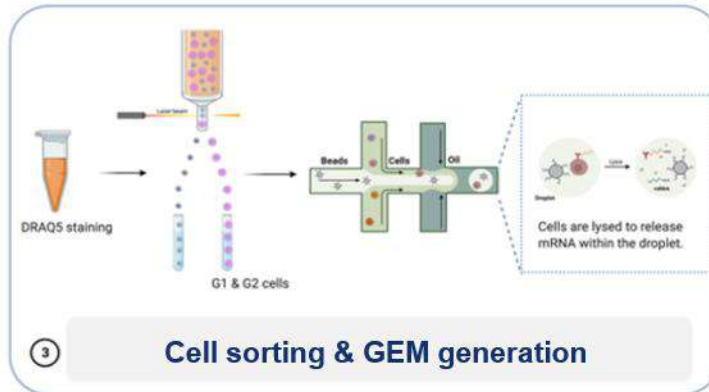
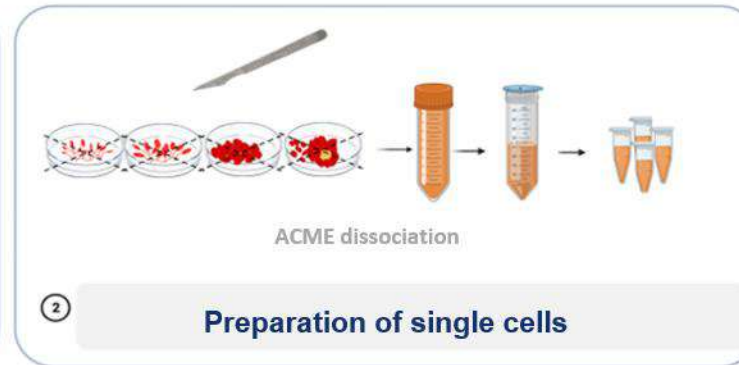
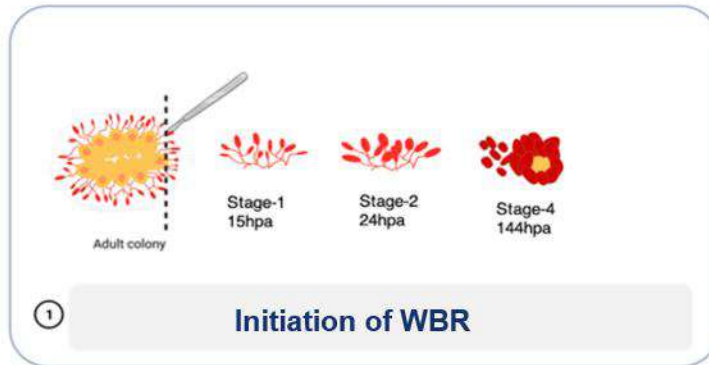
1. Vascular condensation (0-4dpa)
2. Formation of regeneration niches (4-6dpa)
3. Single niche undergoing organogenesis (6-9dpa)

(dpa- day post amputation)

Questions

- Origin of stem cells?
- Identification of those tissues?
- Can we find cell/tissue markers?
- Stem cell fate?

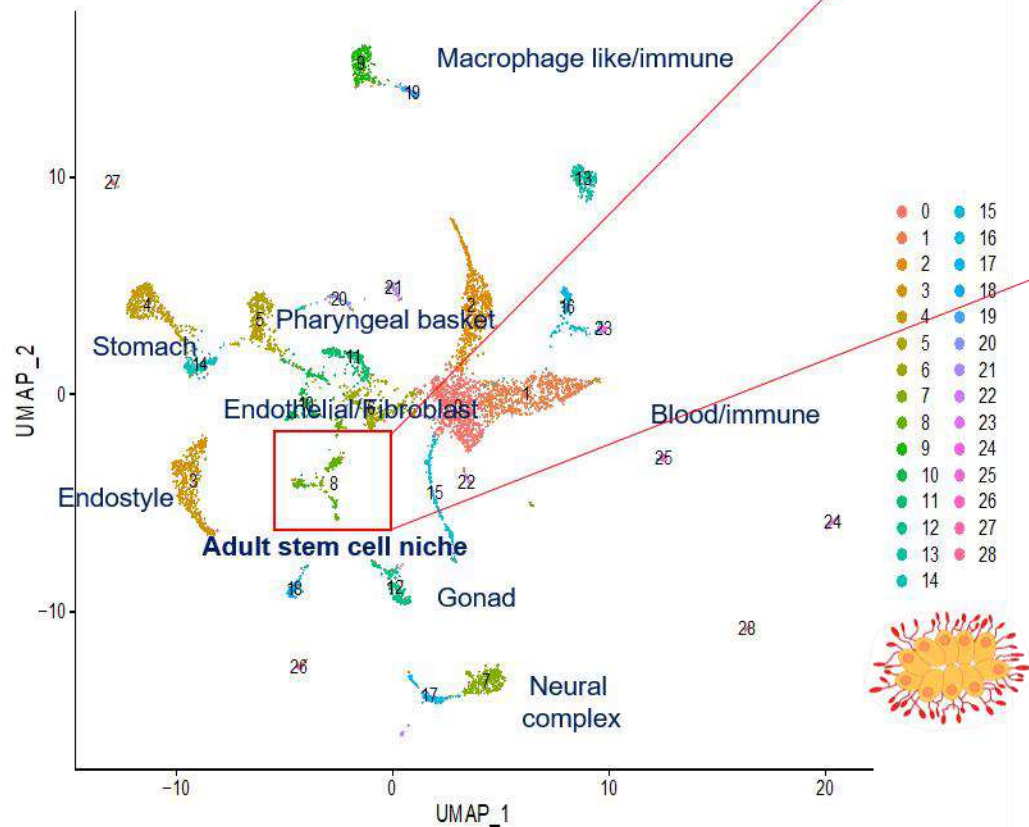
scRNA-seq Pipeline



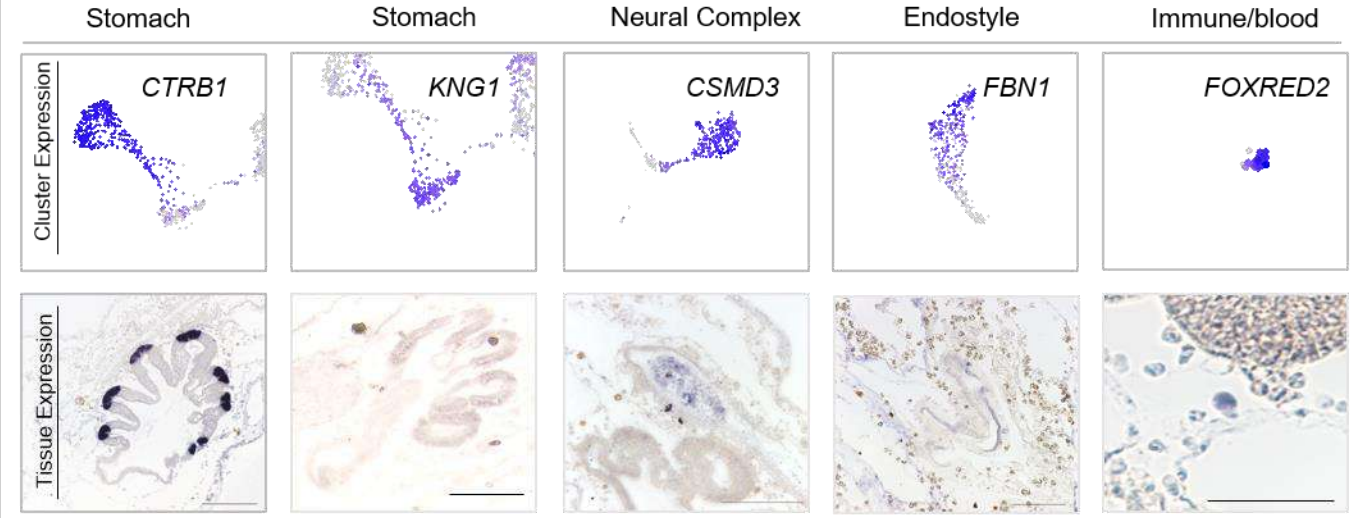
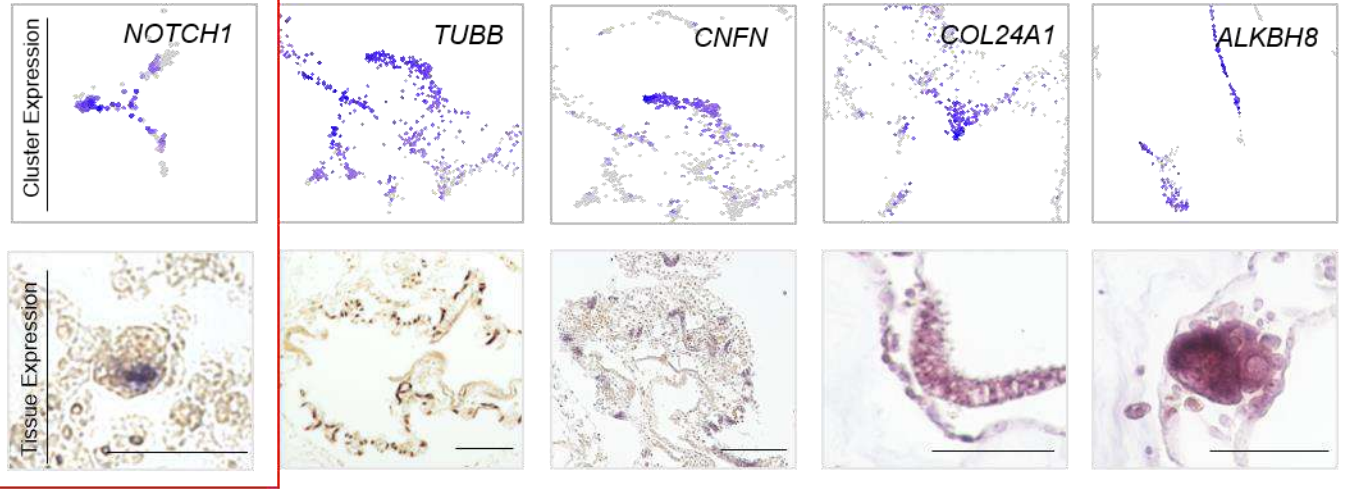
Results

Mature colony

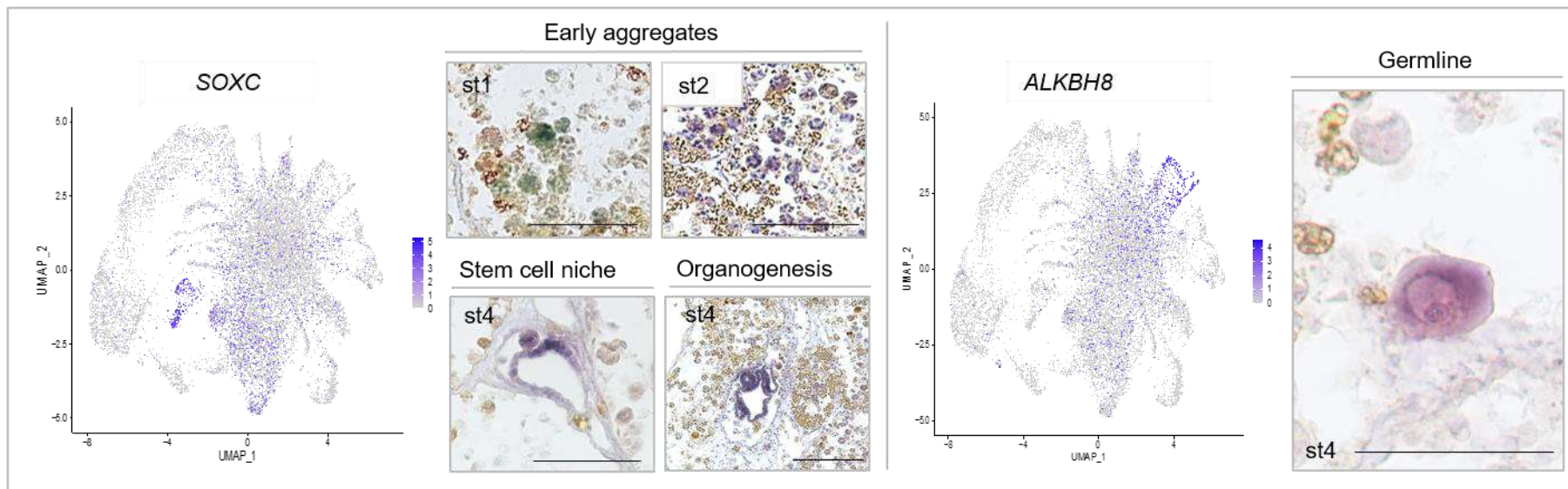
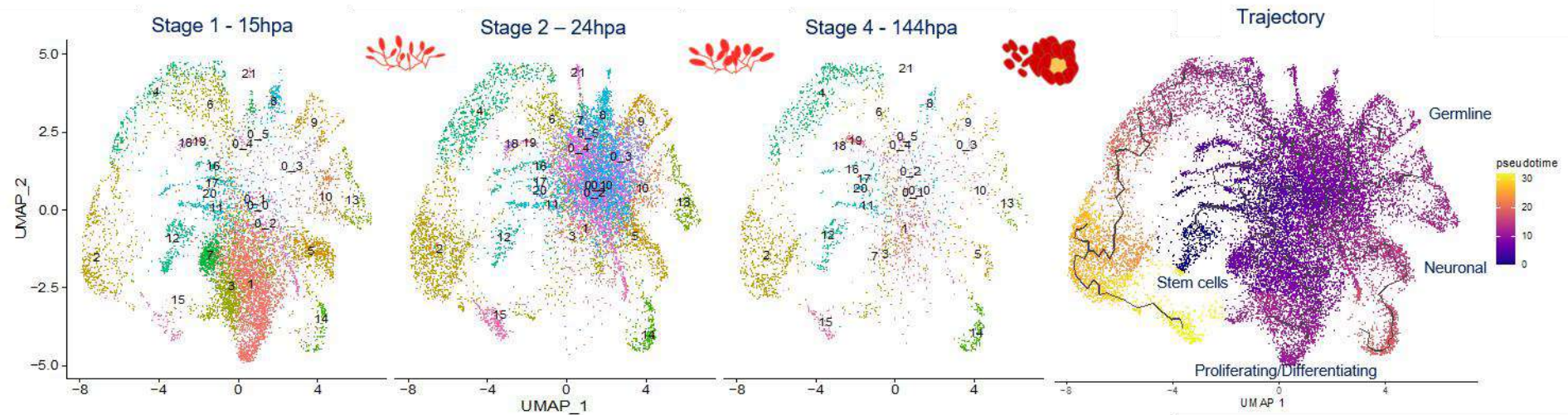
- *Notch1* is a marker for stemness and its spatial expression enriched in a somatic stem cell niche.
- This niche is located in the vascular tissue and probably are fibroblast cells.



Adult stem cell niche



Regenerating colony



Summary

- We identified at least 10 different tissues of mature colony.
- Including somatic stem cell niche, endothelial, endostyle, gonad, pharyngeal basket, neural complex, digestive tissue.
- We predict the fibroblasts lining the vascular epithelia are able to dedifferentiate into progenitor cells.
- *SoxC* is a putative stem cell marker during WBR and *Notch1* is required for stemness in the mature colony.

What's next?

- Complete the examinations of the spatial and tissue/cell type expression of cluster marker genes.
- Carry out a siRNA study to knockdown *SoxC* expression to determine if it is required for WBR.

Acknowledgments

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Department of Anatomy



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Department of Marine Science



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Assoc Prof Dr Megan Wilson



Dr Michael Meier



Wilson Lab