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Annotated Bibliography

1. Asahina, M., Azuma, K., Pitaksaringkarn, W., Yamazaki, T., Mitsuda, N., Ohme-Takagi, M., Yamaguchi, S., Yamiya, Y., Okada, K., Nishimura, T., Koshiba, T., Yokota, T., Kamada, H., & Satoh, S. (2011). Spatially selective hormonal control of RAP2.6L and ANAC071 transcription factors involved in tissue reunion in Arabidopsis. *PNAS.* **108**(38): 16128-16132.

This paper shows that tissue healing in *Arapidopsis* is caused by uneven auxin supply on either side of an incision. Additionally, other factors like ethylene and jasmoic acid can enhance this effect. The source of auxin comes from shoot apices, and removing different parts of the plant can affect the intensity of the healing response because it will alter the relative amount of auxin supplied to the wound site. Overall, this research has little to do with my project, except that it provides a sample model for how plant polarity can result in healing and regeneration in plants.

2. Giles, K.L. (1971). Dedifferentiation and regeneration in bryophytes: A selective review. *New Zealand Journal of Botany.* **9**(4): 689-694.

This was a great review on bryophyte dedifferentiation and regeneration. I explored all the things known in 1971 about moss dedifferentiation, including observations made by many older papers. It didn't have much information on the molecular processes involved because it is a fairly old paper itself, but it provided me with some good information none the less.

3. Ishikawa, M., Murata, T., Sato, Yoshikatsu, Nishiyama, T, Hiwatashi, Y., Imai, A., Kimura, M., Sugimoto, Nagisa, Akita, Asaka, Oguri, Y., Friedman, W.E., Hasebe, M., & Kubo, M. (2011). *Physomitrella* cyclin-dependent kinase A links cell cycle reactivation to other cellular changes during reprogramming of leaf cells. *The Plant Cell.* **23:** 2924-2938.

This paper shows the first molecular mechanism discovered in bryophytes involved in dedifferentiation of cells. First, they show that leaf cells are arrested in the S-phase by comparing the genomic content with other plants of similar genomic size. They use *Physomitrella* as a model organism. They show that when you cut leaves off *Physomitrella*, the cut edge will form cells that are indistinguishable from the apical cells of chloronemata. They found that a protein called CDKA is necessary for this cell cycle progression, and that it activates CDKD. CDKA is present in all cells at all times, which is what inspired my hypothesis for the presence of a 'persitent stabilizing factor'.

4. Hiwatashi, Y. Cultivation of protonemat and gametophores. *PDF*. Lasted edited by Mitsuyasu Hasebe: June 2004.

The PDF I found that describes BCDAT media and its derivatives.

5. Kofuji, R., & Hasebe, M. (2014). Eight types of stem cells in the life cycle of the moss *Physcomitrella patens*. *Current Opinion in Plant Biology*. **17**: 13-21.

This is a review of different kinds of stem cells in my model organism. Most of the paper is only vaguely applicable to my project, but it provides an interesting context for studying stem cells. It also gives some information about chloronema and caulonema. A small part of the paper explores the various systems already studied in *Physcomitrella patens*, including auxin, cytokinin, and transcriptional pathways.

6. Mackler, S.A., Brooks, B.P., & Eberwine, J.H. (1992). Stimulus-Induced Coordinate changes in mRNA Abundance in Single Postsynaptic Hippocampal CA1 Neurons. *Neuron*. **9**: 529-548.

This paper demonstrates that it is possible to make a glass pipette small enough to penetrate a single cell. They use a machine in the paper to pull the pipette. I would likely use a mouth aspirator to remove the cytoplasm in my project to establish more control over the force.

7. Maltzahn, K.E. V. (1959). Interaction between kinetin and indoleacetic acid in the control of bed reactivation in *Splachnum ampullaceum* (L.) Hedw. *Nature,* **183**: 60-61.

This was an old, short paper on how adding indoleacetic acid to tips of *S. ampullaceum* could stop lateral bud growth. Usually, cutting off the tip of this mass results in increased lateral branch growth, so this suggests that much like angiosperms, there is some sort of signal emitted from the apical cell in mosses. This is an example of how mosses can have a 'stabilizing' signal within all cells that stop growth of dedifferentiation. They do not address dedifferentiation of leaf cells in this paper, however—only lateral bud growth.

8. Nishiyama, T., Hiwatashi, Y., Sakakibara, K., Kato, Masahiro, & Hasebe, M. (2000). Tagged Mutagenesis and Gene-trap in the Moss, *Physcomitrella patens* by Shuttle Mutagenesis. *DNA Research*. **7**: 9-17.

This paper explains how to transform *P. patens*.. It is of use to me mostly because of its methods, which uses a shuttle mutagenesis technique.

9. Reid, J.B., & Ross, J.J. (2011). Regulation of tissue repair in plants. *PNAS*. **108** (42): 17241-17242.

This paper reviews how plants (mostly angiosperms) regulate tissue repair. It is in response to the Asahina et al (2011) paper, and provides a bit more context for their research. It was mostly interesting to me because I wanted to know what other kind of models existed for plant healing and regeneration. They also touch a bit on pant cell dedifferentiation, but since angiosperms form structures called 'calli' during dedifferentiation, it is very different from moss dedifferentiation.

10. Reski, R. (1999). Molecular genetics of *Physcomitrella*. *Planta*. **208**: 301-309.

This is a review of the history of genetic studies in mosses. They mention some other mosses, but focuses mostly on *Physcomitrella patens*. Most of it is not applicable to my project, but it did allow me decide on a model organism.

11. Sakakibara, K., Reisewitz, P., Aoyama, T., Friedrich, T., Ando, S., Sato, Y., Tamada, Y., Nishiyama, T., Hiwatashi, Y., Kurata, T., Ishikawa, M., Deguchi, H., Rensing, S.A., Werr, W., Murata, T., Hasebe, M., & Laux, T. (2014). *WOX13-like* genes are required for reprogramming of leaf and protoplast cells into stem cells in the moss *Physcomitrella patens*. *Development*. **141**: 1660-1670.

This paper discovered a gene homolog to stem cell regulators in angiosperms that plays a role in cell dedifferentiation in *P. patens*: ppWOX13LA an ppWOX13LB. Deletions of this gene result in mutants that cannot form the apical stem cell in dedifferentiating leaf cells. Additionally, expression of ppWOX13LA and ppWOX13LB show increases in transcription after leaf detachment. Interestingly, after detachment all cells in the leaf show increased ppWOX13LA/B expression, but only cells destined to dedifferentiate further increase in brightness afterward. Through a variety of experiments, they showed that the mutation likely affects cell wall functioning, because mutants also show struggled growth in different osmotic gradients. In conclusion, this paper further supports the idea that cells bordering cut sites will show differential gene expression.

12. Shaefer, D. (1994). Molecular genetic approaches to the biologyof the moss *Physcomitrella patens* [PhD thesis]. *University of Lausanne*. (Http://www.unil.ch/lpc/docs/DSThesis.htm)

This paper is cited by Nishiyama et al (2000).

13. Westerdijk, J. (1907). Zur Regeneration der Laubmoose. *Rec. Trav. Bot. Neerl.* **3**: 1-66.

AND

14. Wettstein, E. V. (1924). Morphologie und Physiologie des Formwechsels der Moose auf genetische Grundlagen, *I.S. induckl. Abstamm. Vererb. Lehre.* **33**: 1-236.

The two citations above are unfortunately in another language. I did not read them myself, but Giles (1971) cited both of them for some important observations made about mosses.

Melissa Chen
32465114

Reference not cited in my paper, but which had a large influence on my proposal:

Van der Poorten, A. & Goffinet, B. (2010). Introduction to Bryophytes. Cambridge University Press: New York.

This was my textbook for the UBC BIOL 321 class (Bryology) and provided me with the basic information about moss development, ecology, and lifestyle. It does not have much to say about moss dedifferentiation in general, but it is a good overall review about what makes moss unique. It also has information about the different classes of bryophytes.

Xu, L., & Huang, H. (2014). Genetic and epigenetic controls of plant regeneration. *Current topics in developmental biology.* **108**: 1-33.

This was an absolutely huge review on plant regeneration. Although there was only a small moss section, it provided a great context for moss dedifferentiation because it explained all that we know about plant regeneration in general. It was helpful to know what the limitations of plant regeneration vs moss regeneration were, and it helped me define what was exactly different between plant dedifferentiation and moss dedifferentiation. Additionally, it went through a lot of models of plant degeneration pathways, which allowed me to form a hypothesis for moss dedifferentiation based on these ideas.

La Farge, C., Williams, K.H., & Engalnd, J.H. (2013). Regeneration of Little Ice Age bryophytes emerging from a polar glacier with implications of totipotency in extreme environments. *PNAS.* **110**(24): 9839-9844.

This paper explores how mosses are able to germinate from gametophyte fragments that were previously frozen in glaciers. Most of the fragments appear completely dead—yet they are able to produce protonema!

Bopp, M. (2008). Development of protonema and bud formation in mosses. *J. Linn. Soc. (Bot.), 58*(373), 305-309.

This reference shows that the hormones that protonema excrete work in a concentration-dependent manner, and that different factors are released at different stages to induce growth patterns. Protonema appear to inhibit each other, and thus promote a spread-out growth pattern. They identified two factors : Factor H (secreted from caulonema) which promotes bud formation, and Factor F (secreted from caulonema) which inhibits bud formation.

Saunders, M.J., & Hepler, P.K. (1983). Calcium antagonists and calmodulin inhibitors block cytokinin-induced bud formation in *Funaria*. *Developmental Biology.* **99:** 41-49.

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32465114

This reference adds onto the process of bud formation in mosses. They show that in *Funaria hygrometrica*, the cytokine-induced bud formation relies on the rise of intracellular calcium. It appears that calcium sources are from the outside of the cells, since calcium uptake inhibitors will prevent cell division, and consequently differentiation. This suggests that mosses are often reliant on exogenous signals to develop, and that nutrient availability may play a role in signalling to cells when to develop.