PhD Diary 28th January

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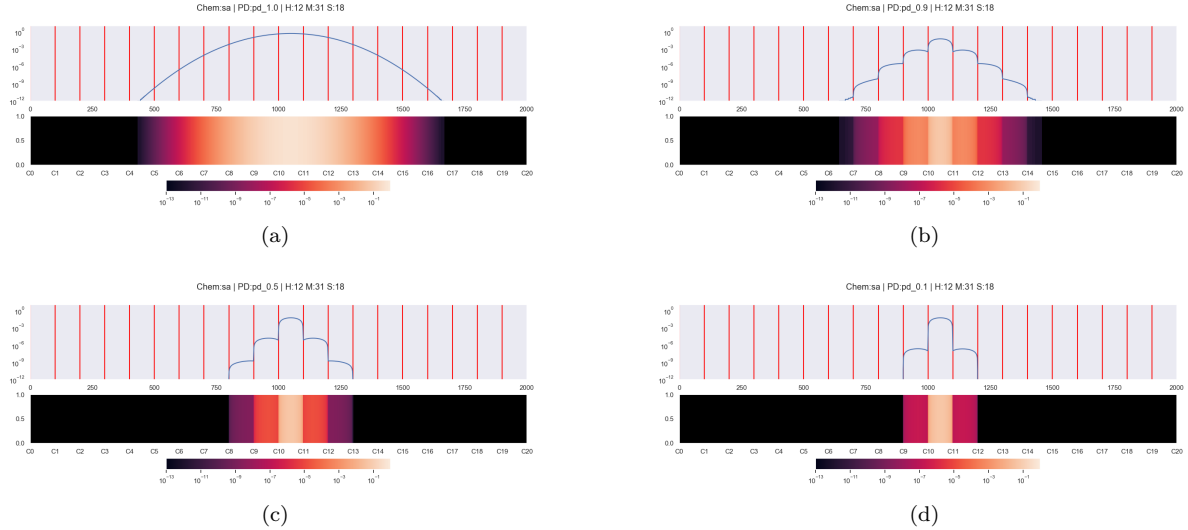
Contents

1 Data analysis

1.1 Currently have

- Concentration C per cell i at every time point t for both calcium and salisylic acid and for multiple permeability's of plasmodesmata q

1.1.1 Examples of data



(a) (b) (c) (d)

Figure 1: Salisylic Acid transport at various permiability's of plasmodesmata

1.2 Analysis idea

1.2.1 Data analysis

- Run something like a GLM on these data
- Take sum of squares percent contributions and evaluate which has largest effect size between chemical size, plasmodesmata permeability in relation to both distance travelled (of a minimum concentration) and/or concentrations with respect to time and space

1.2.2 Data comparing

- Compare data to literature and see if expectations of distance travelled is similar to anything else suggested in literature

1.3 TODO Improvements [0/1]

- ☐ Integrate binding constants / hill equation ideas to produce a decay rate
- ☐ Predict, from literature, estimates of other cells production

2 TODO Spatial and temporal transcriptomic analysis of the *Arabidopsis thaliana-Botrytis cinerea* interaction Mulema and Denby (6)

1. Would it be possible to get a hold of the transcriptomics data
   - There may also be an interest in Windram et al. (8) also
2. What could I possibly do with the data if we got it?

3 QUESTION From a list of hormones/proteins can I look up gene sequence

☐ BLAST?

4 Some sources show clearly between one layer of cells

- Clark et al. (1)

4.1 More potential

- Forde (2)
- Kitagawa and Jackson (5) - meristem examples

4.1.1 From meristem paper

- Gaillochet et al. (3), Soyars et al. (7), Heidstra and Sabatini (4)

References

[1] Natalie M Clark, Elizabeth Hinde, Cara M Winter, Adam P Fisher, Giuseppe Crosti, Ikram Blilou, Enrico Gratton, Philip N Benfey, and Rosangela Sozzani. Tracking transcription factor mobility and interaction in Arabidopsis roots with fluorescence correlation spectroscopy. *eLife*, 5, June 2016. ISSN 2050-084X. doi: 10.7554/eLife.14770.

[2] Brian G. Forde. The role of long-distance signalling in plant responses to nitrate and other nutrients. *Journal of Experimental Botany*, 53(366):39–43, January 2002. ISSN 0022-0957. doi: 10.1093/jexbot/53.366.39.

[3] Christophe Gaillochet, Gabor Daum, and Jan U Lohmann. O Cell, Where Art Thou? The mechanisms of shoot meristem patterning. *Current Opinion in Plant Biology*, 23:91–97, February 2015. ISSN 1369-5266. doi: 10.1016/j.pbi.2014.11.002.

[4] Renze Heidstra and Sabrina Sabatini. Plant and animal stem cells: Similar yet different. *Nature Reviews Molecular Cell Biology*, 15(5):301–312, May 2014. ISSN 1471-0080. doi: 10.1038/nrm3790.

[5] Munenori Kitagawa and David Jackson. Plasmodesmata-Mediated Cell-to-Cell Communication in the Shoot Apical Meristem: How Stem Cells Talk. *Plants*, 6(1):12, March 2017. doi: 10.3390/plants6010012.

[6] Joseph M. K. Mulema and Katherine J. Denby. Spatial and temporal transcriptomic analysis of the Arabidopsis thaliana–Botrytis cinerea interaction. *Molecular Biology Reports*, 39(4):4039–4049, April 2012. ISSN 1573-4978. doi: 10.1007/s11033-011-1185-4.

[7] Cara L Soyars, Sean R James, and Zachary L Nimchuk. Ready, aim, shoot: Stem cell regulation of the shoot apical meristem. *Current Opinion in Plant Biology*, 29:163–168, February 2016. ISSN 1369-5266. doi: 10.1016/j.pbi.2015.12.002.

[8] Oliver Windram, Priyadharshini Madhou, Stuart McHattie, Claire Hill, Richard Hickman, Emma Cooke, Dafyd J. Jenkins, Christopher A. Penfold, Laura Baxter, Emily Breeze, Steven J. Kiddle, Johanna Rhodes, Susanna Atwell, Daniel J. Kliebenstein, Youn-sung Kim, Oliver Stegle, Karsten Borgwardt, Cunjin Zhang, Alex Tabrett, Roxane Legaie, Jonathan Moore, Bärbel Finkenstadt, David L. Wild, Andrew Mead, David Rand, Jim Beynon, Sascha Ott, Vicky Buchanan-Wollaston, and Katherine J. Denby. Arabidopsis Defense against Botrytis cinerea: Chronology and Regulation Deciphered by High-Resolution Temporal Transcriptomic Analysis. *The Plant Cell*, 24(9):3530–3557, September 2012. ISSN 1040-4651, 1532-298X. doi: 10.1105/tpc.112.102046.