
EMBO
Workshop
New model systems for
early land plant evolution
22 – 24 June 2016 | Vienna, Austria

The role of plastid exaptations in streptophyte terrestrialisation

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- Algal plastids: still active transcription after isolation
- Eventual gene transfer from plastid to nucleus (*Zygnematophyceae*, land plants) aided in adaptation to the stresses of terrestrial life (better regulation)
- **change in plastid biology = pre-adaptation to life on land**

Unraveling key transcription factor functions in *Marchantia polymorpha*

Sabine Zachgo

Botany Department, Osnabrück, Germany

- Transcription factors in liverwort…

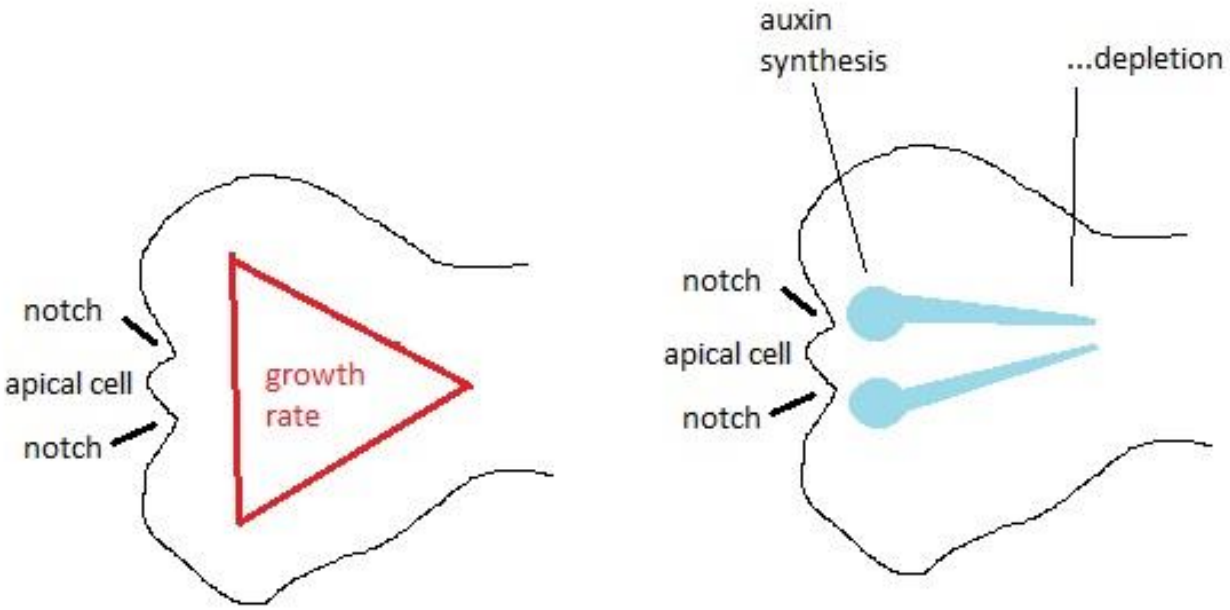
	Arabidopsis	*Marchantia*
TCP	24	2
TGA/ROXY/NPR	10/21/7	1/2/1
MADS-BOX	106	2

- e.g.: **MADS-2** knock-out:
  - *Marchantia*: indeterminate archeoniophore growth
  - Land plants: also something about floral meristem determinate character…

Mechanisms for shape determination in the liverwort *Marchantia polymorpha*

Jill Harrison, Nik Cuniffe, Jeremy Solly
University of Bristol, Bristol, United Kingdom

- Computer modeling of liverwort growth
- Perhaps regulated by auxin-gradient
    - Experiments with L-Kyn (Trp-dependent synthesis inhibitor)
    - Model disregards dorsoventrality…



Investigation of polarity establishment in *Marchantia polymorpha*

John Bowman, Tom Fisher, Eduardo Flores-Sandoval

Monash University, Melbourne, Australia

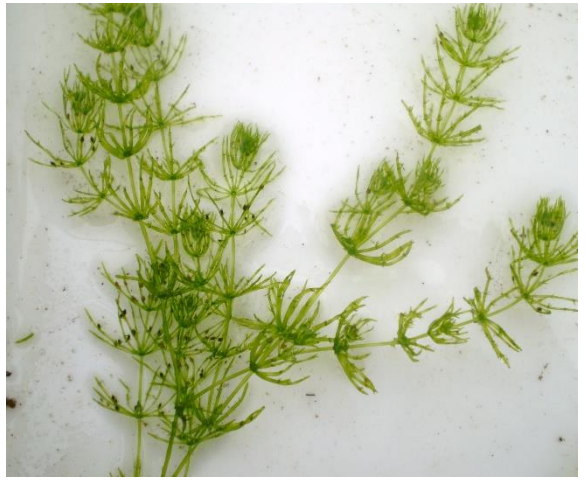
- Auxin = rhizoid initiator, moves from top (dorsal) to bottom (ventral)
- Synthesis: YUCCA, TAA (Ishizaki: TAA *knock-out* = total retard, restored by IAA)
- Signaling: TIR1/AuxIAA/ARF (ARF1 repression = ugly ball of cells)

- **MpPIN1**
    - PM, mostly in apical meristem
    - RNAi = totally messed up all polarity
    - Knock-out = rhizoids on top

- Some Hd-Zip mutants – also dorsoventrality problems, maybe basal auxin signaling pathway (4 homologs in *Klebsormidium*)
- Spores don't germinate in the dark, but they do when soaked in auxin
- Air pores – possibly an auxin sink

Why we need more polished genomes and better sampling: lessons from *Physcomitrella* and *Chara*

Stefan Rensing
University of Marburg, Marburg, Germany



- *Chara braunii*:
    - 2.3 Gbp, 14 chromosomes (large, but smaller than human…)
    - transposons = at least 60% of total genomic DNA
    - **First alga with ARF (1x) & Aux/IAA (2x)**

The *Anthoceros agrestis* genome

Peter Szovenyi
University of Zurich, Zurich, Switzerland

- The only plant where chloroplasts have pyrenoids
- *Nostoc* (cyanobct) & *Glomerom* (fungus) symbiosis
- Basal sporophytic meristem

- Tiny **genome (80 Mbp),** but **25-30k genes**; 55% land plant homologs, 45% unique
- Low repeat content (7%), possibly response to auxin (GH3)

Other cool stuff:

- Several general knowledge lectures by the cream-of-the-crop people (Kenrick, Forrest, Delwiche)
- Kato: **ARF**s in ***Marchantia*** – ARF1 k.o. weak compared to TIR1, he's preparing a multiple mutant…
- Nishihama: the importance of promoters (**EF vs. 35S** – totally different phenotypes)
- Becker: transcription maps of *Physcomitrella* (online browser)
- Reski: **Cooksonia-like phenotypes in *Physcomitrella*** – zygote retention (=sporophyte development) may be explained by miss-expression of **BELL1**
- Marcoux: cell-specific transcriptomes in streptophyte algae *(Coleochaete, Spirogyra)*
- Sekimoto: transcriptome of *Closterium*, mostly studies of sexual reproduction
- Ohta: auxin inhibits cell division in *Klebsormidium* (but only in ungodly concentrations…)