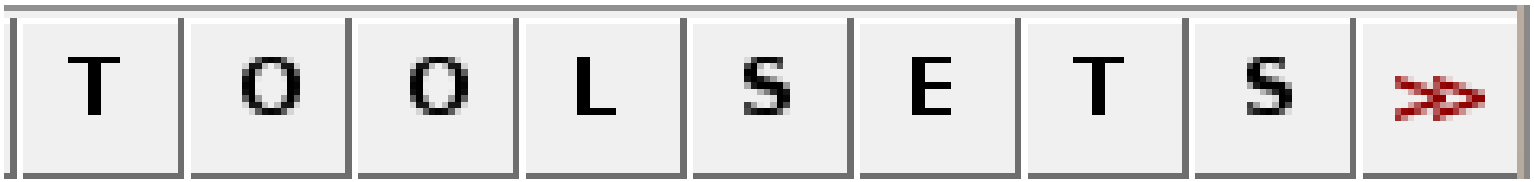
ImageJ Macro

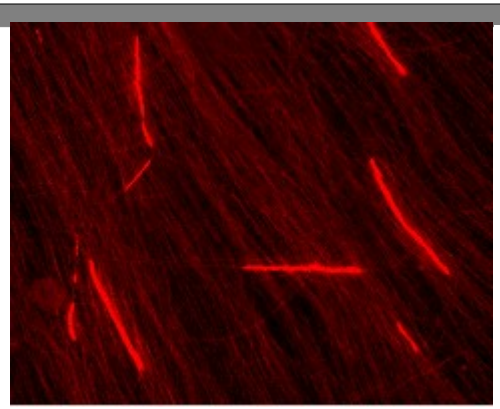


for
Biological Image Analysis

Volker Bäcker

Introduction

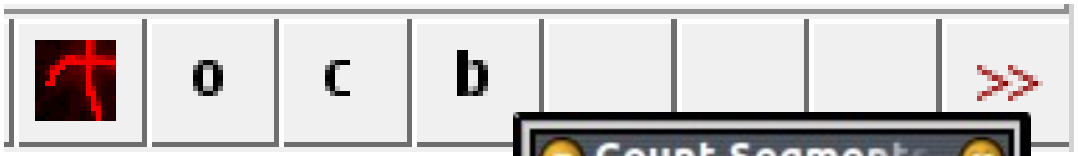
- imaging facility
  - image analysis solutions
  - ImageJ macro tool sets
    - options and default values
    - help page on redmine
      - installation
      - usage
      - example images
    - interactive version
    - batch version



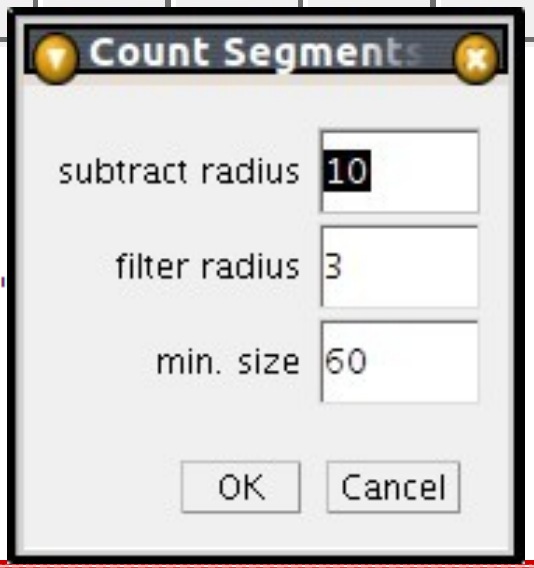
The **Count Segment Tools** allow t
this one: example image. The seg

Getting started

To install the tools, drag the link M
macros/toolsets in the ImageJ instal



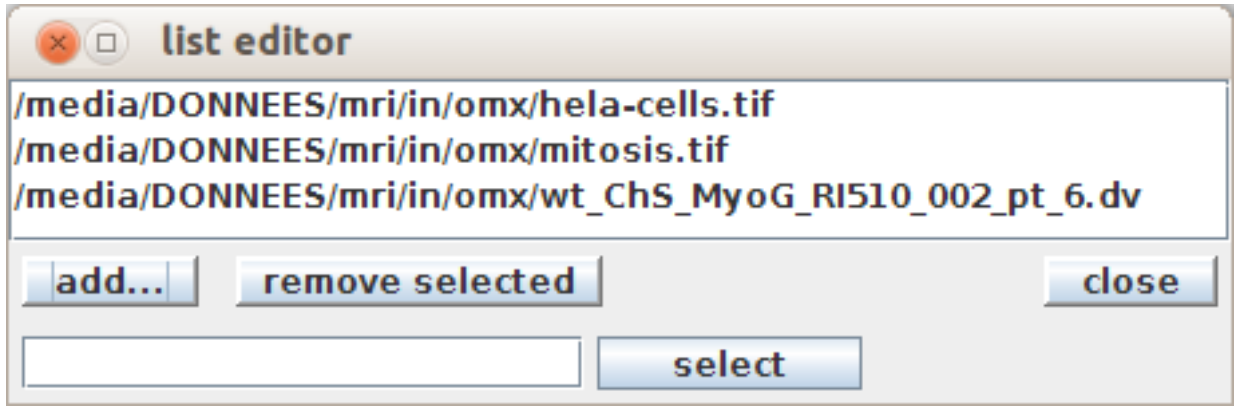

```
var subtractRadius = 10;
var filterRadius = 3;
var minSize = 60;

macro "Unused Tool - C037
```

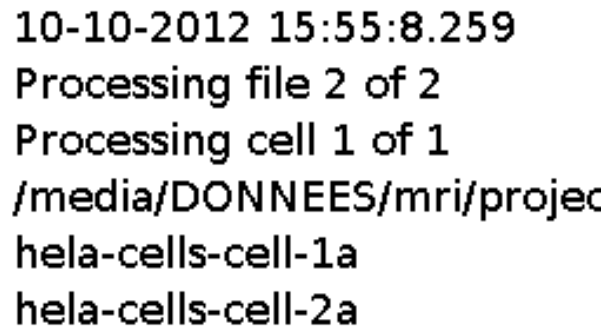


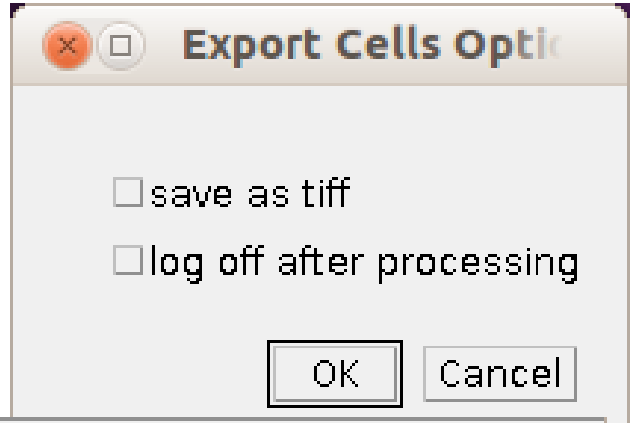
Introduction

- interactive version
  - keyboard shortcuts
- batch version
  - specify input / output
    - MACRO_IO_SETTINGS
  - show progress / exceptions
  - log-off

```
macro "Next Image [f4]" {
   nextImageAction();
}
```

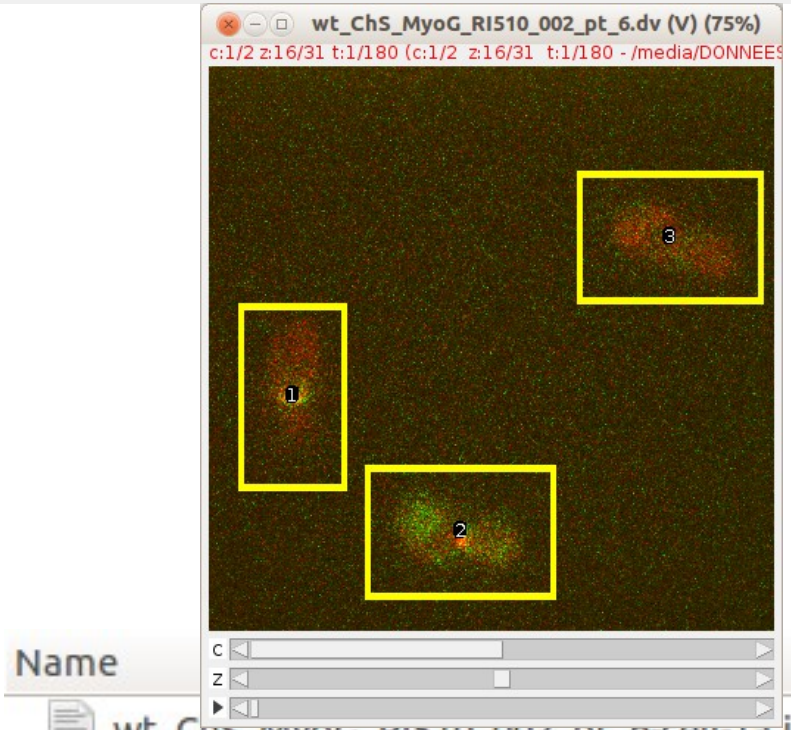






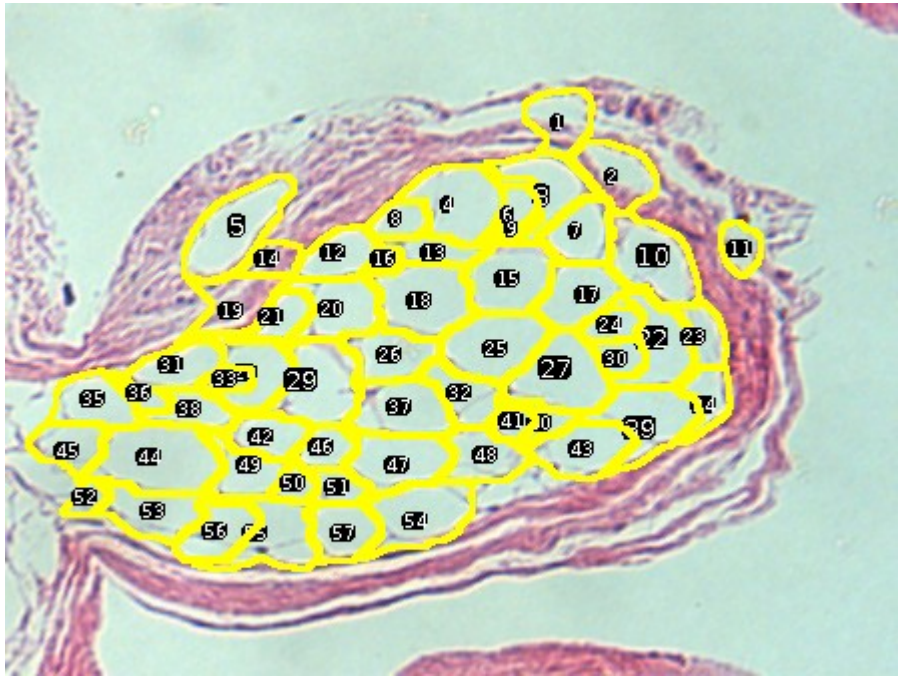
Crop 4D Cells

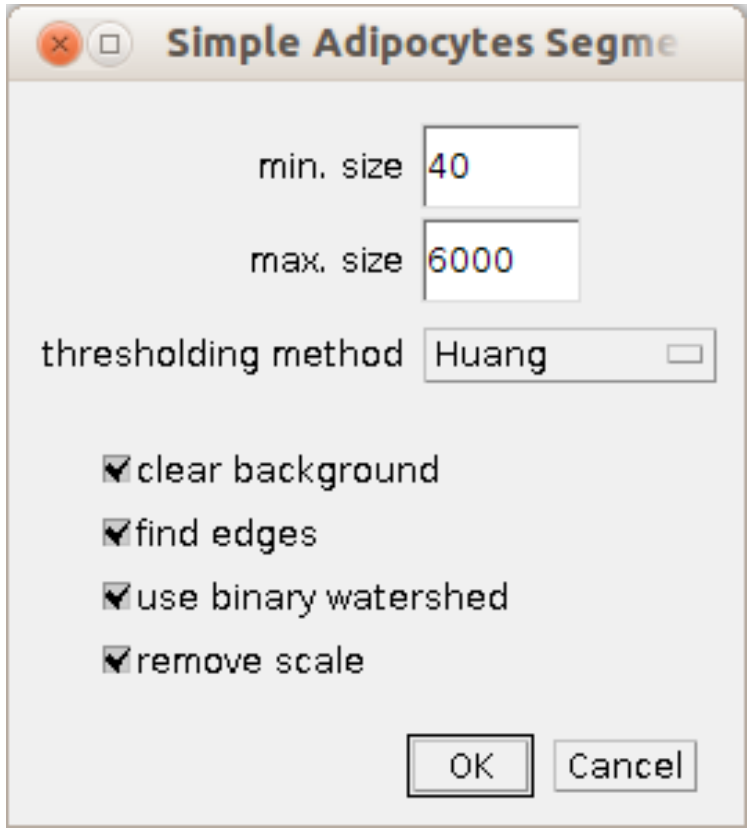
- Input images:
  - OMX, deltavision, 4D, big
- export regions of interest
  - 4D, .ics or tif, matlab or huygens (hrm)
- solution
  - setup list of input images / output folder
    - use loci with virtual stack option
  - navigate between images
  - make multiple selections per image
    - saved automatically
  - export regions in batch mode
  - close session



Adipocytes Tool

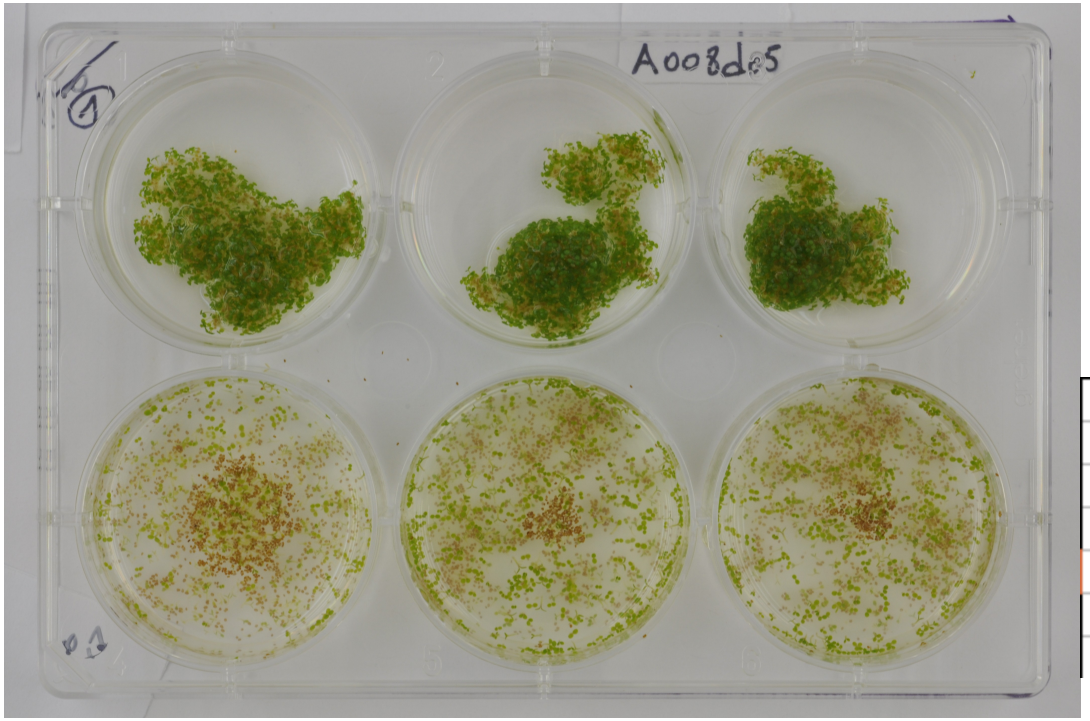
- count cells and measure areas
  - pre-processing
  - simple segmentation
  - grayscale watershed segmentation





Arabidopsis Seedlings

- measure surface of green pixels
  - per well and image
  - in batch mode



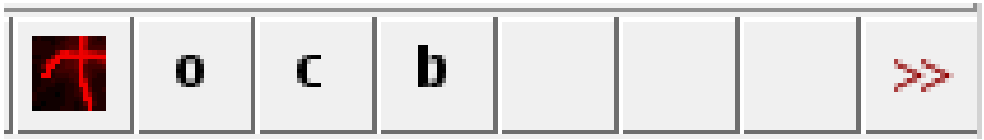
Well Distribution Options

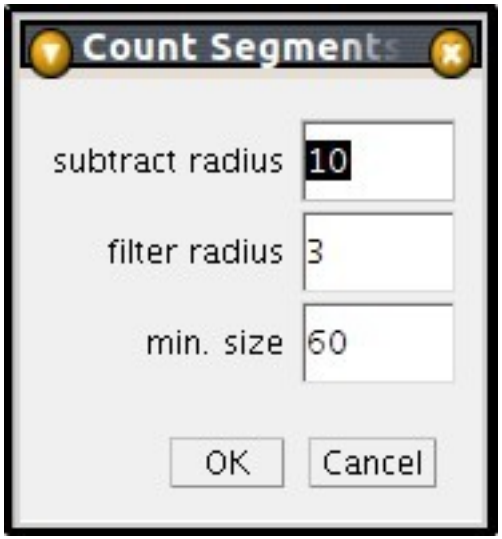
rows	2
columns	3
x-offset	280
y-offset	0
diameter	1250

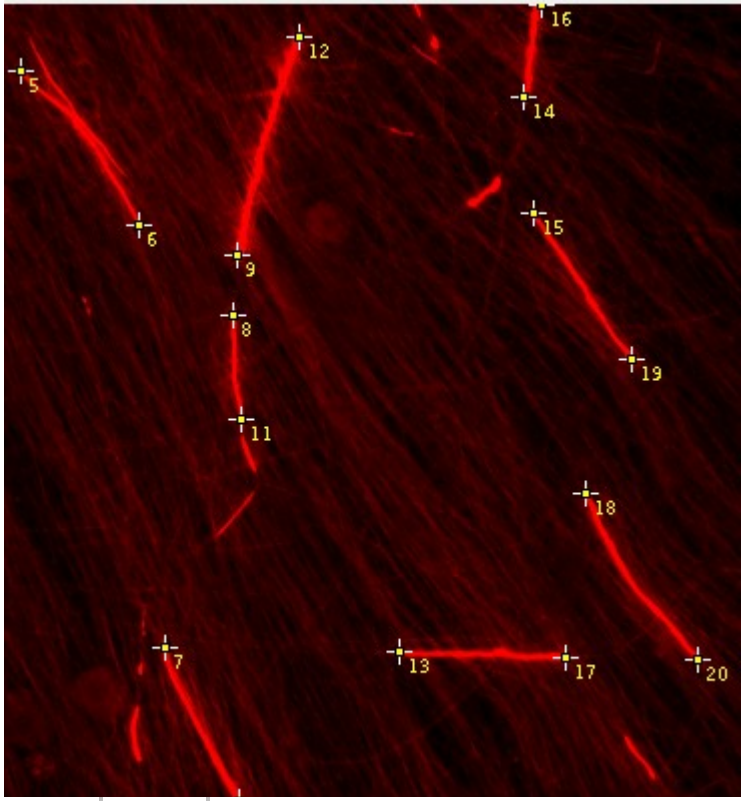
	Label	Area
1	/media/DONNEES/mri/in/seed_lings/A008d05-0-0.JPG	340603
2	/media/DONNEES/mri/in/seed_lings/A008d05-1-0.JPG	303846
3	/media/DONNEES/mri/in/seed_lings/A008d05-2-0.JPG	233997
4	/media/DONNEES/mri/in/seed_lings/A008d05-0-1.JPG	52801
5	/media/DONNEES/mri/in/seed_lings/A008d05-1-1.JPG	147495
6	/media/DONNEES/mri/in/seed_lings/A008d05-2-1.JPG	117679

Count Segments

- segments can cross each other
- difficult to detect as particles
- solution:
  - count endpoints and divide by two
- algorithm
  - subtract blurred version
  - apply Gaussian-blur
  - IsoData-auto-threshold
  - skeletonize
  - find points with exactly one neighbour (macro)



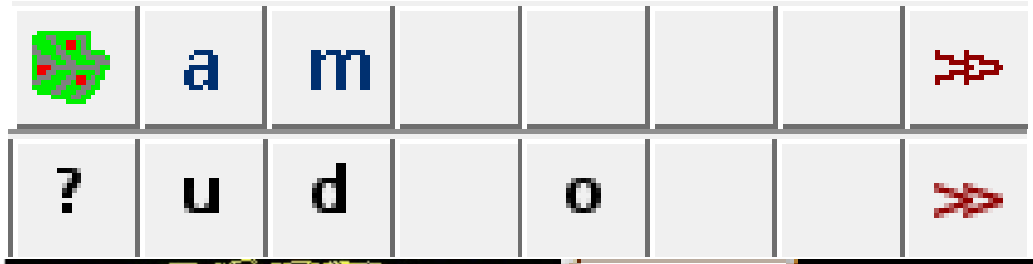


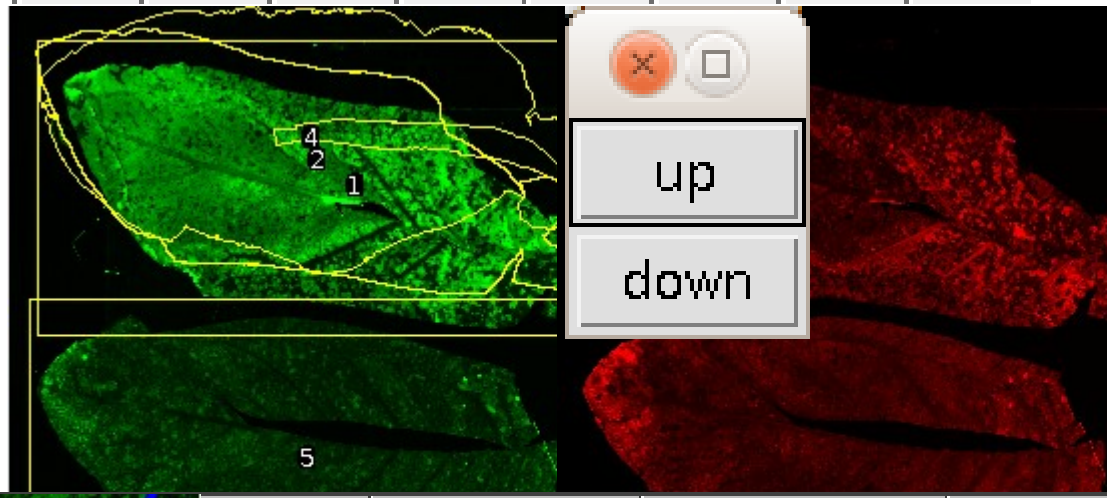


drg9crb3sh1cov3_p79c3.TIF | 10 /media/DONNEES/mri/

Leaf Infection Tool

- virus with two stainings (gfp and rfp), one virus blocks cell for others, knock down of genes of the plant
- Tools:
  - user loads the two channels
  - a - adjust display
  - user selects rectangle around a leave and adds it to the roi-manager
  - user copies the area, selects the leaf and adds it to the roi-manager

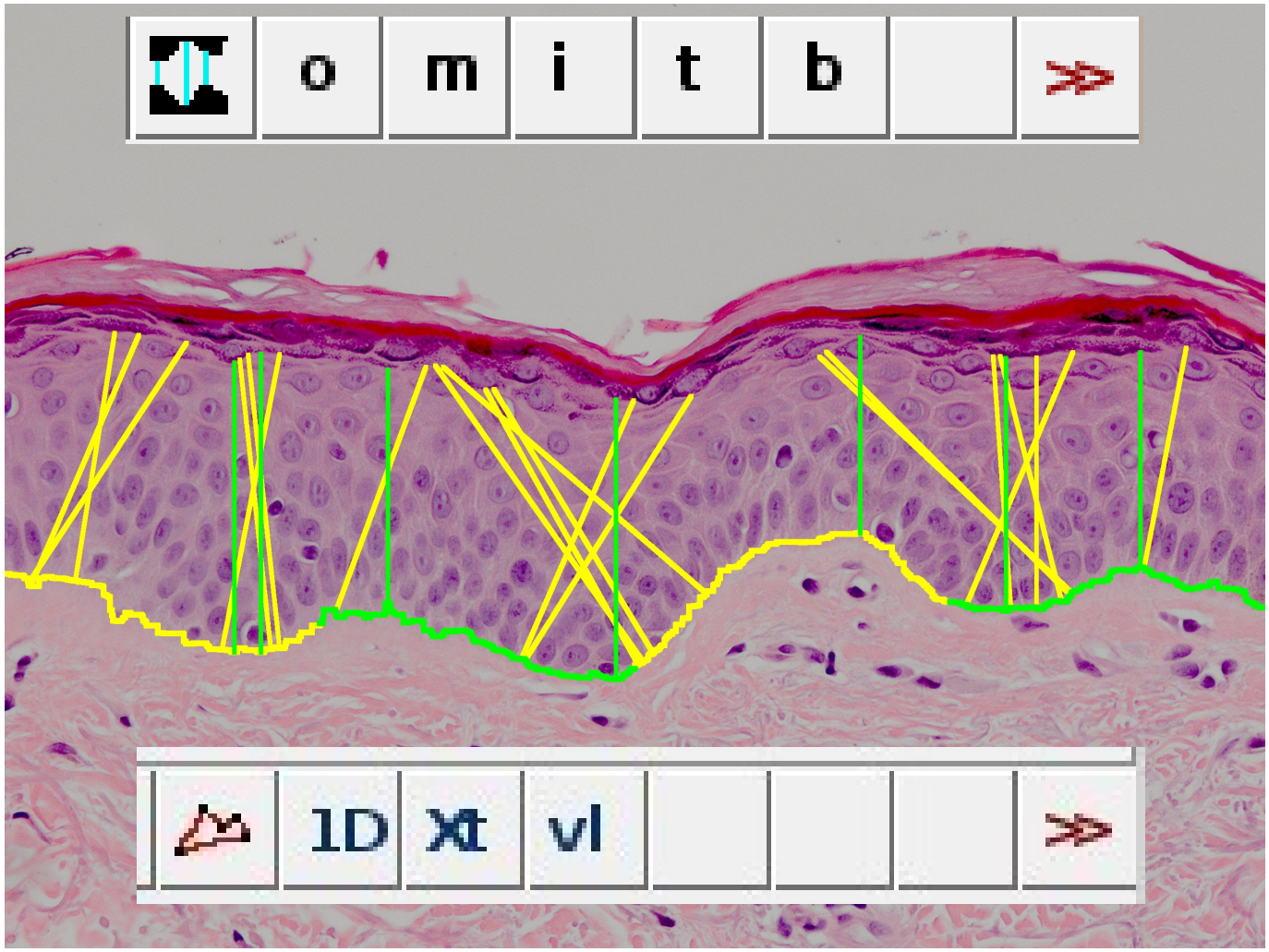




leaf-area	GFP-area	RFP-area	over	perim.	RFP-perim.	overlap-perim.	R
37.5604	11.1811	24.0379	3.38	10.175	113206.078	87609.6499	-0.34915
38.9424	16.0831	18.1418	3.25	79.108	120049.617	90761.4767	-0.36765
42.4002	15.9781	14.0183	7.86	44.161	198441.124	170877.062	0.51454

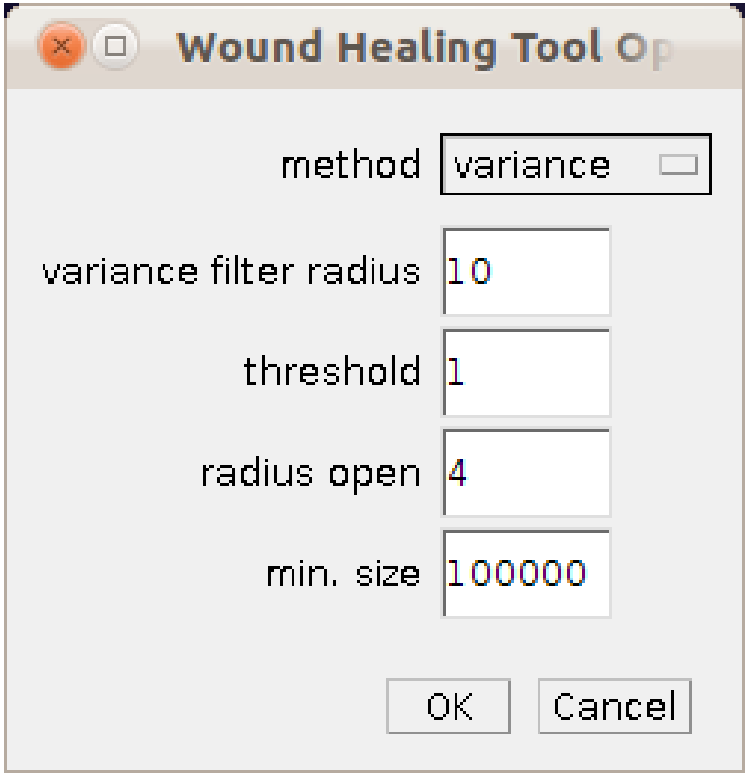
Skin Tools

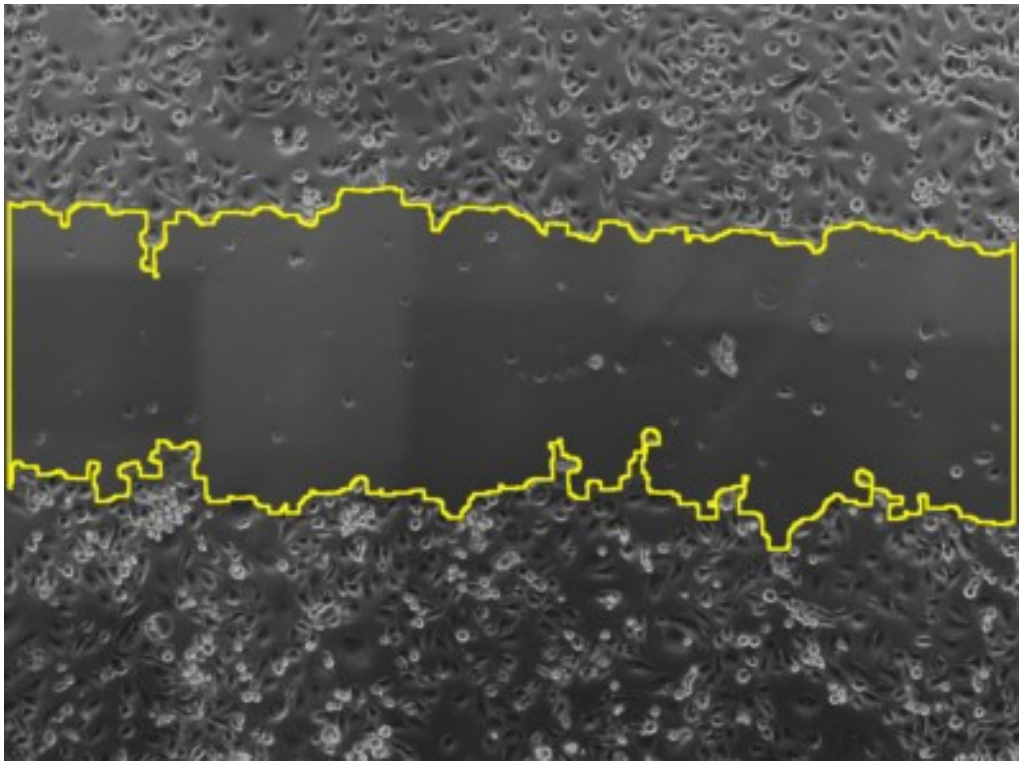
- general **o**ptions
- **m**easure
  vertical lines from extrema
- **i**nterdigitation index
- **t**hickness
  perpendicular random lines
- everything in **b**atch mode
- roi converter tools
  - upper border of 2d-roi to **1d**-roi
  - e**xt**rema of 1d-roi to point-roi
  - **v**ertical **l**ines from 1d-rois



Wound Healing

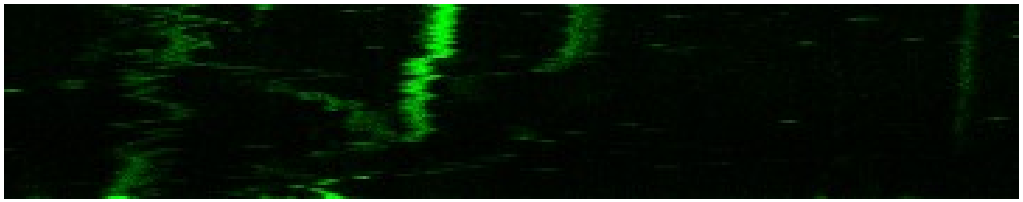
- measure speed of wound healing
  - variance or find edges based



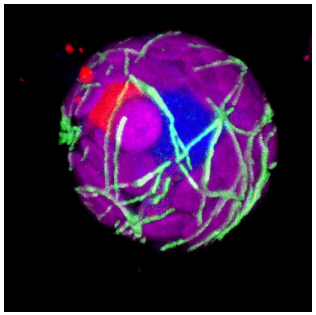


Summery and Outlook

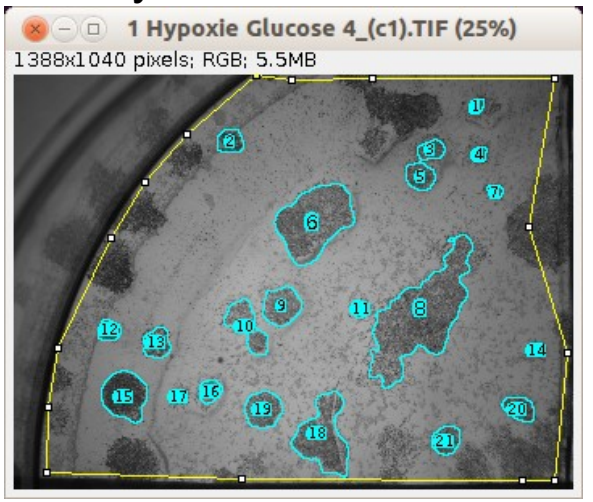
- macro tool sets for biological image analysis
- redmine for documentation and issue tracking (dev.mri.cnrs.fr/projects/imagej-macros)
- single tools – kymograph



- 3d with FIJI – microtubule network



- further tool sets
  - colony blob count tool



- use **Remote ImageJ** to run processing on remote machines
- run processing from web-interface - **Web Image and Data Environment** (WIDE)

Thank you!

- QUESTIONS?

MRI – TIGR

- Stephane Laborie, Olivier Miquel, Corine Tran-Aupiais, Alexandre Granier, Volker Bäcker, Stephanie Vaudescal, Cedric Hassen-Khodja