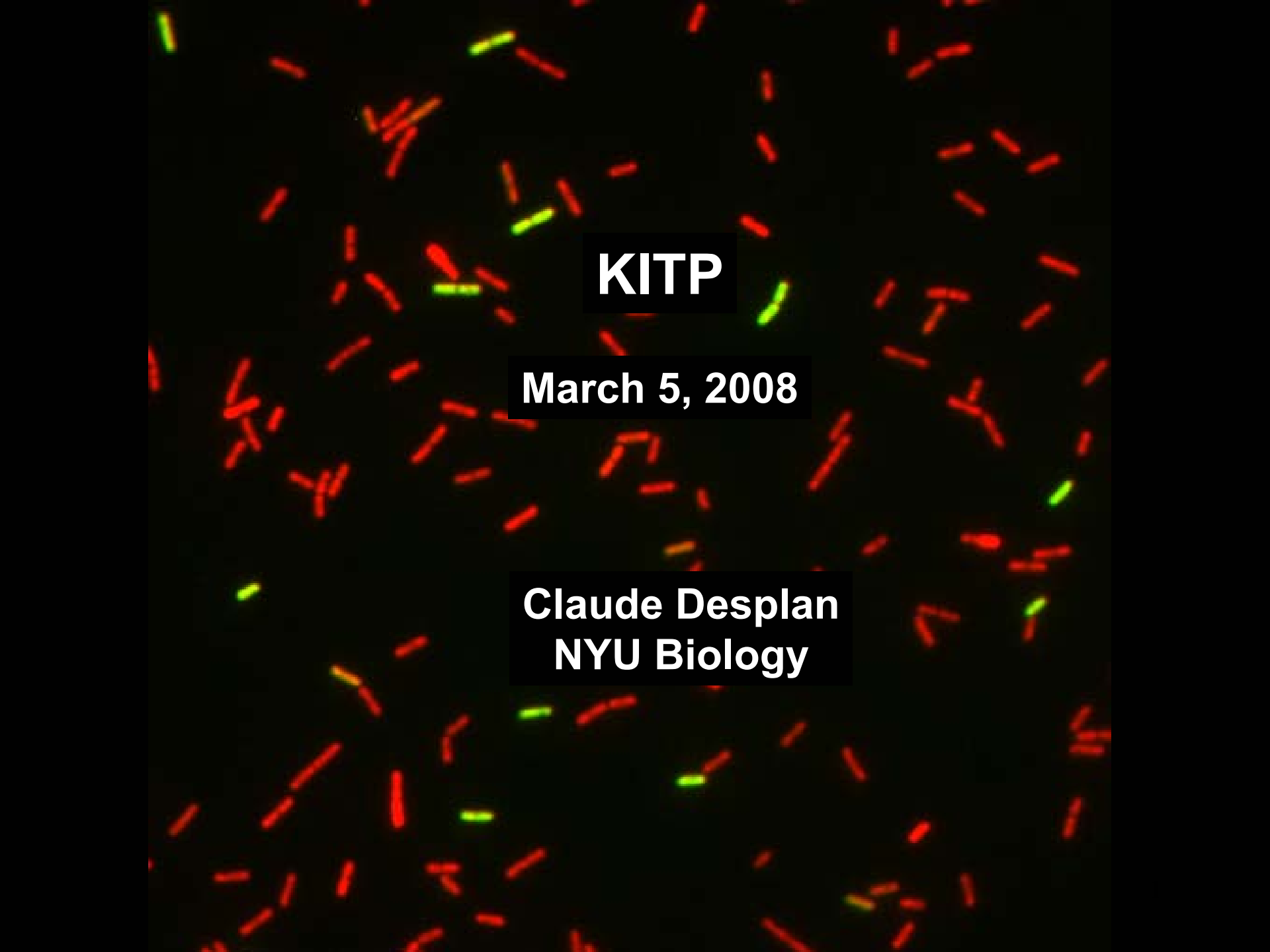
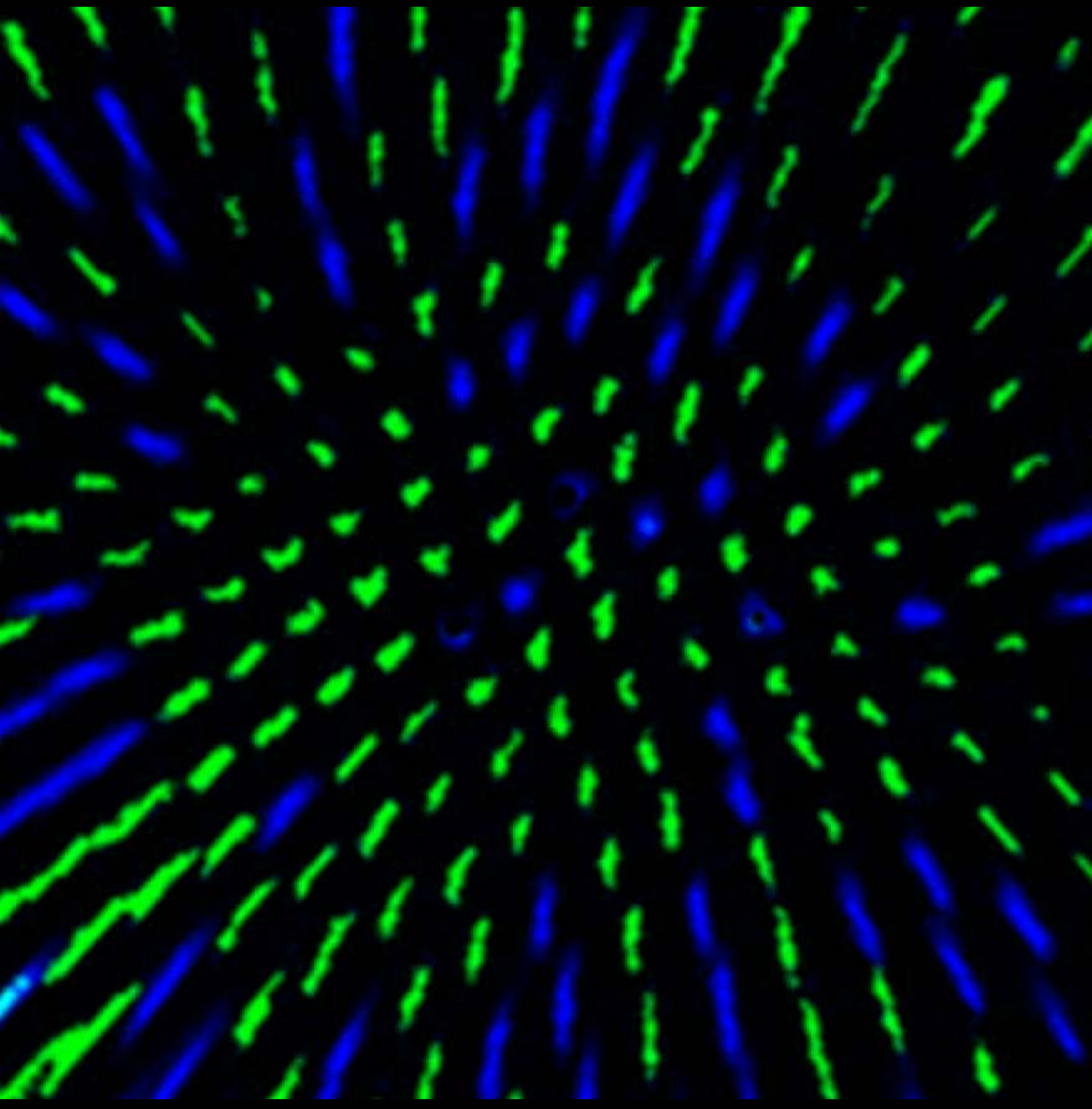

KITP
March 5, 2008
Claude Desplan
NYU Biology

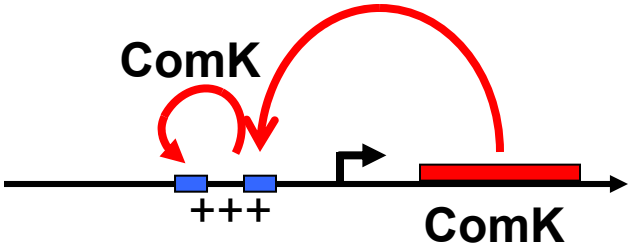


How to make a stochastic choice?

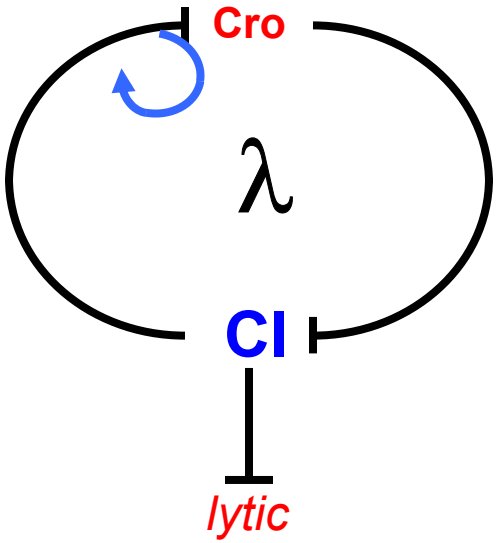
Noise.
- Transcriptional
- Signaling
- Cell history

Hypersensitivity
- Cooperative binding
- Synergistic activation

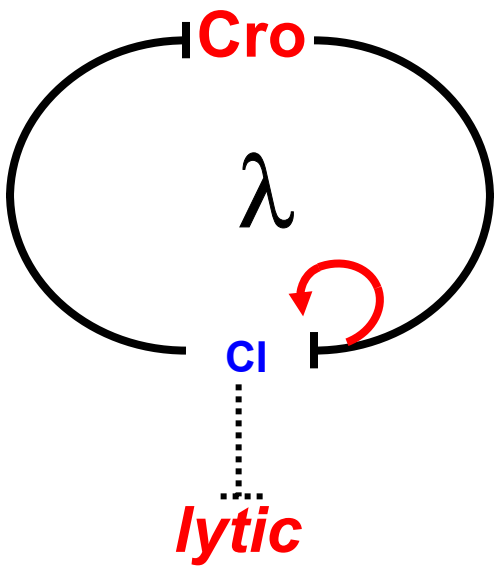
Bi-stable loop
- auto-activation
- double negative
- more complex loops



Dave Dubnau
Mike Elowitz

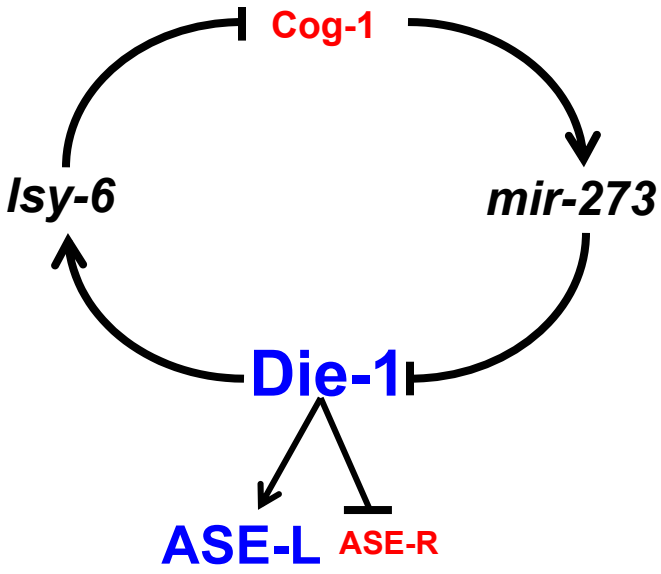


lysogenic

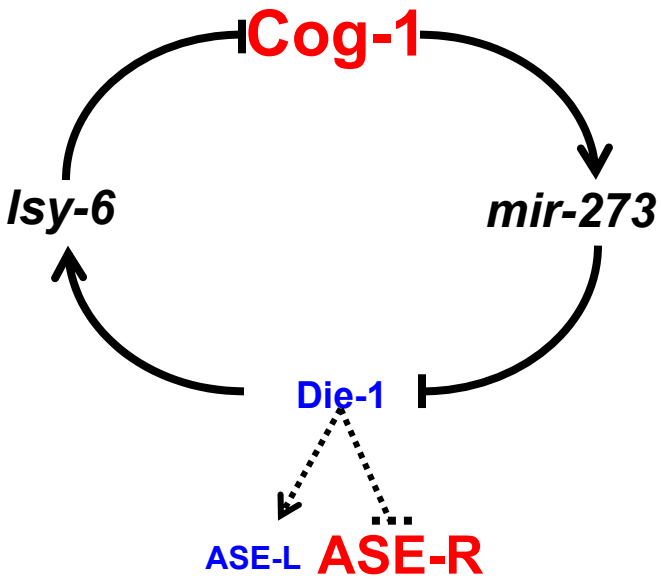


lytic

Left

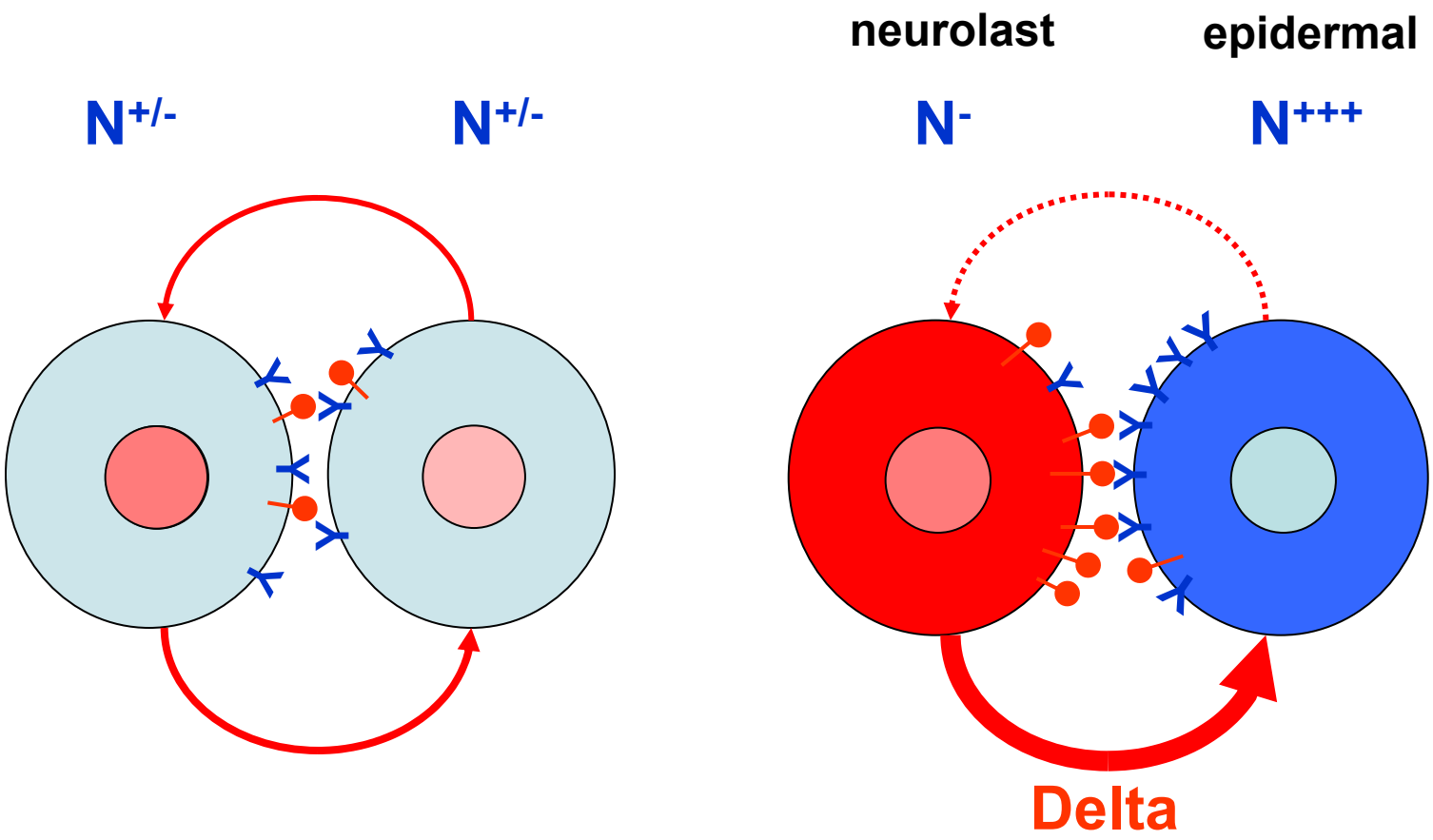


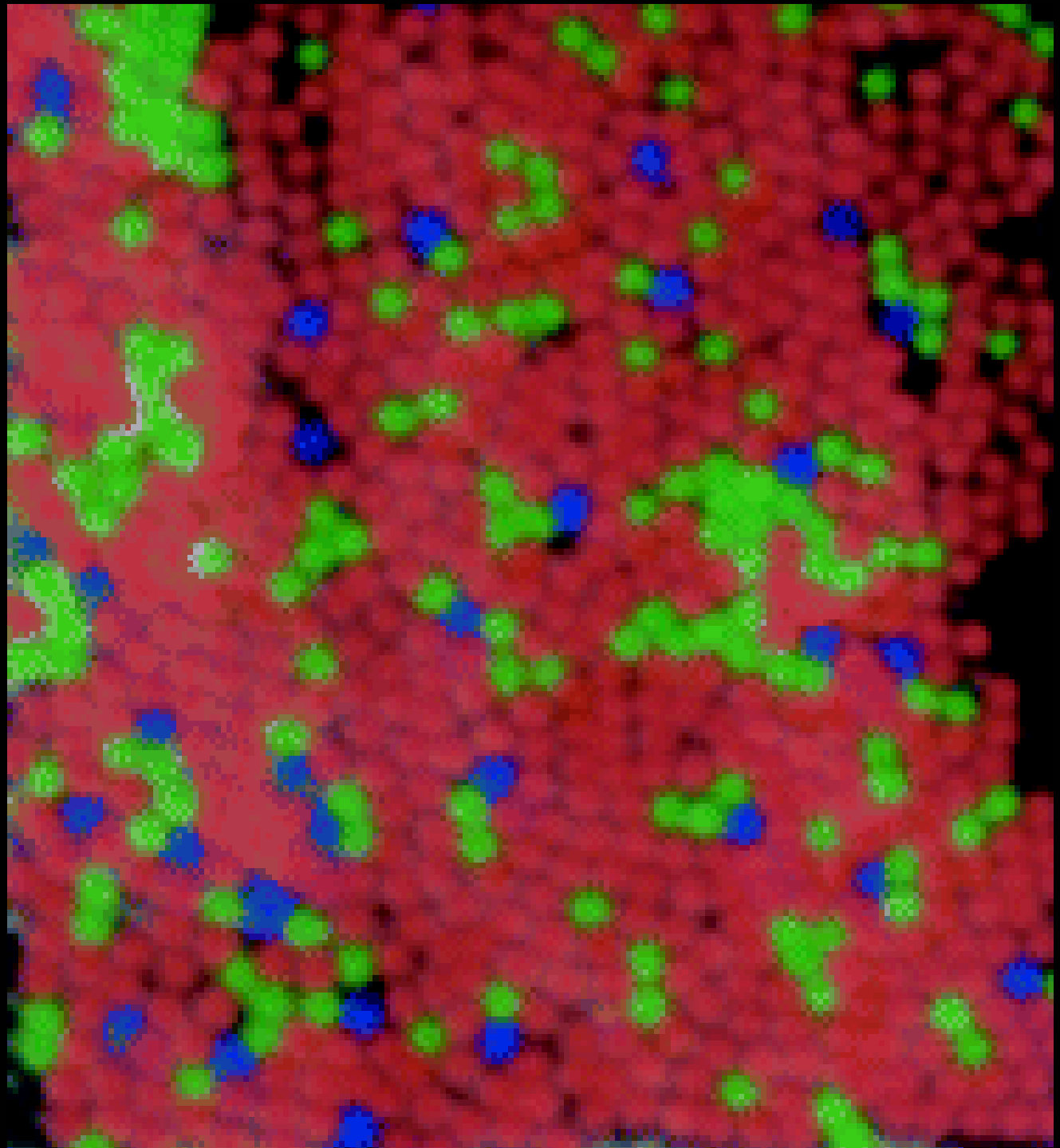
Right

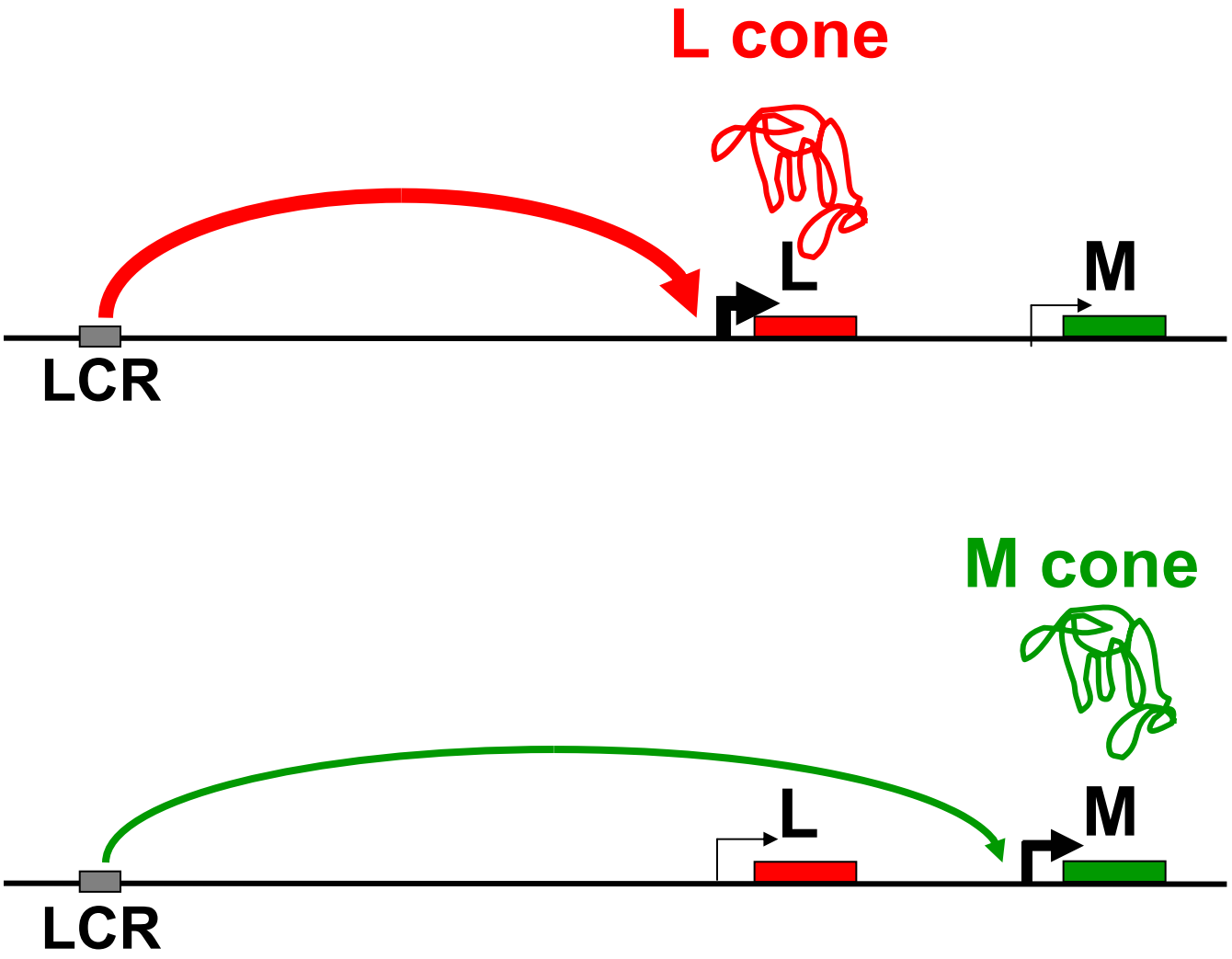


Oliver Hobert

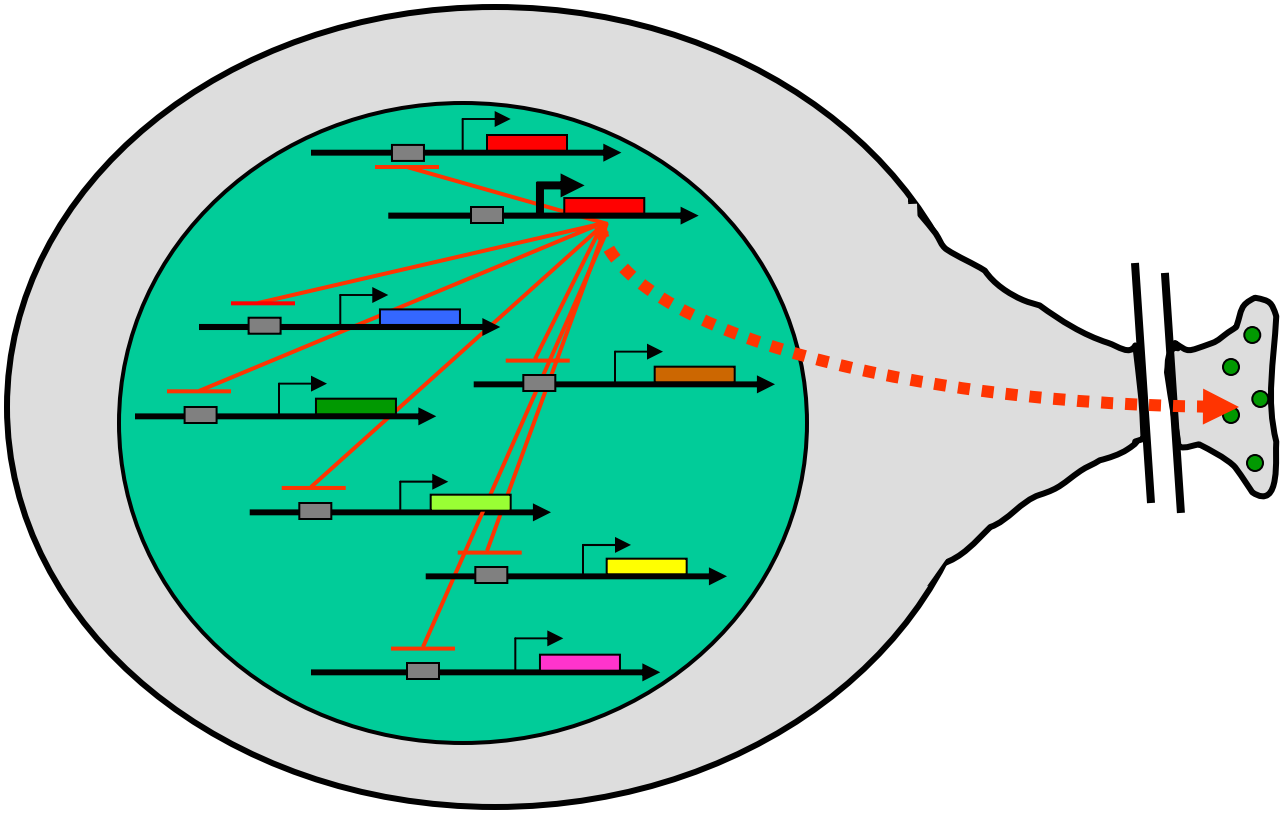
Cell non-autonomous loops

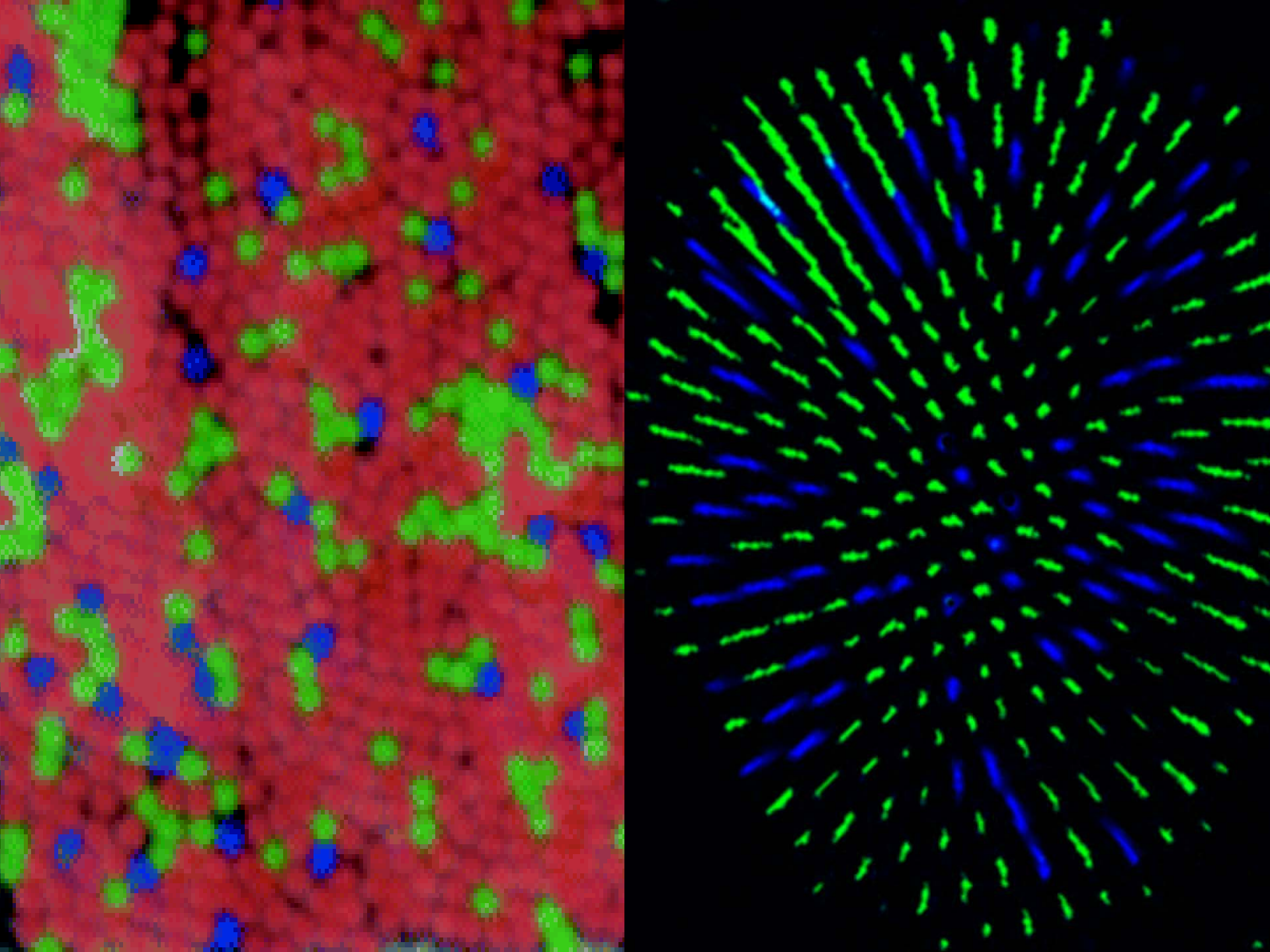


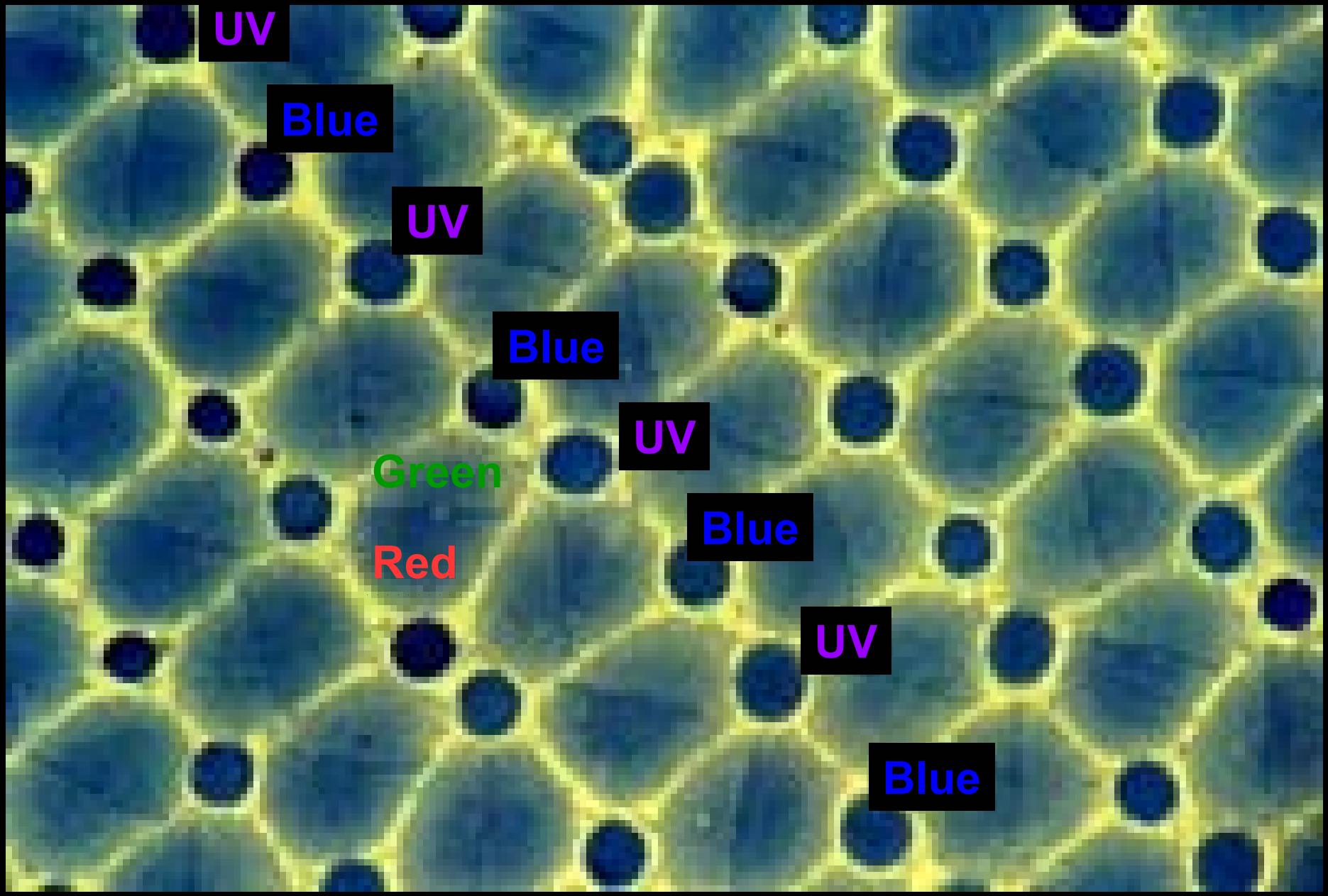


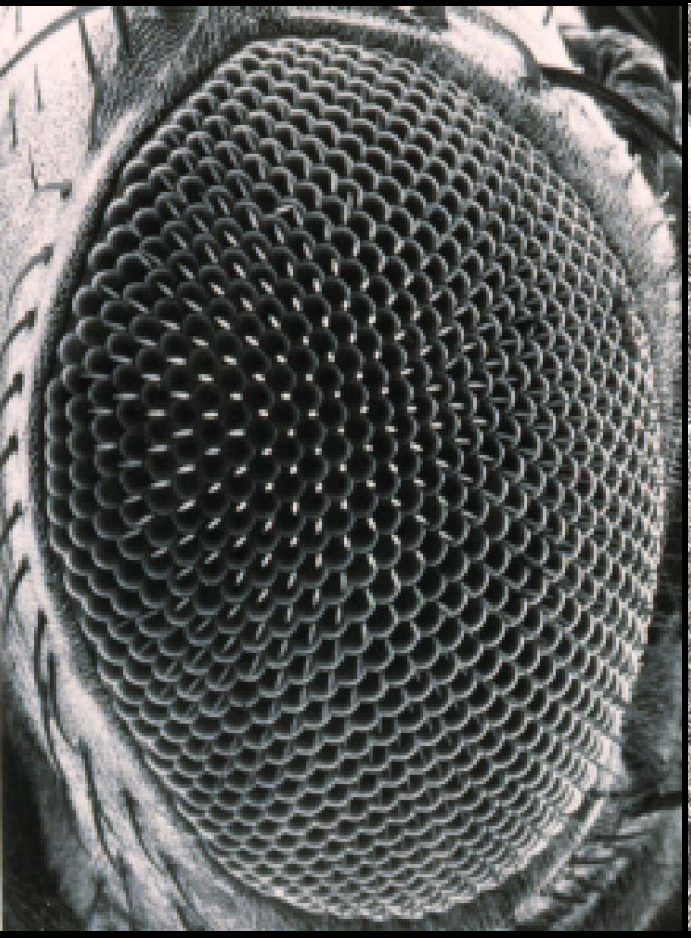


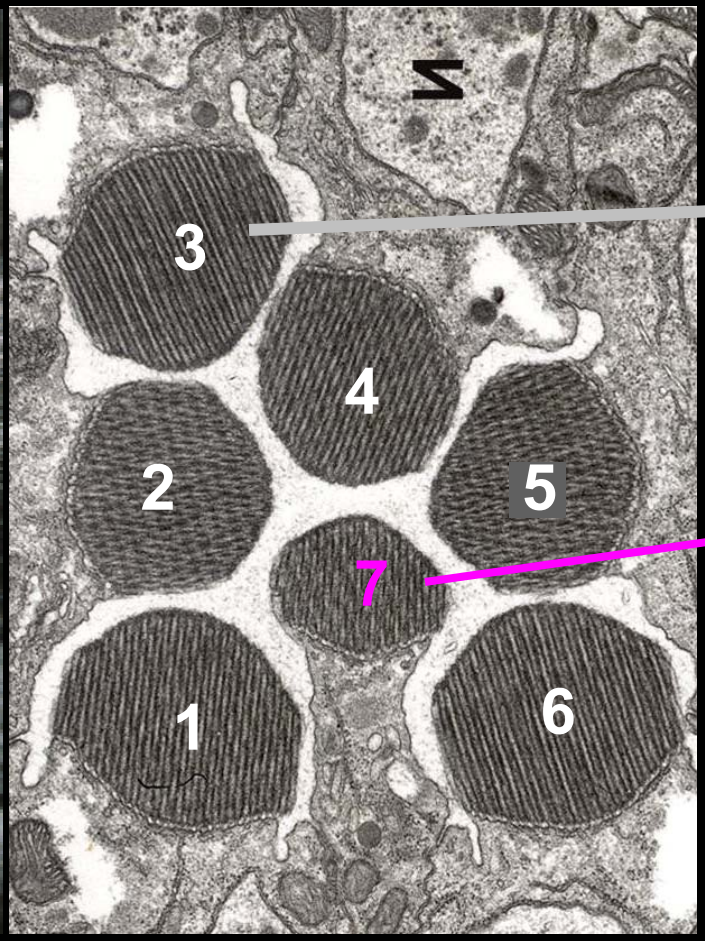
Jeremy Nathans

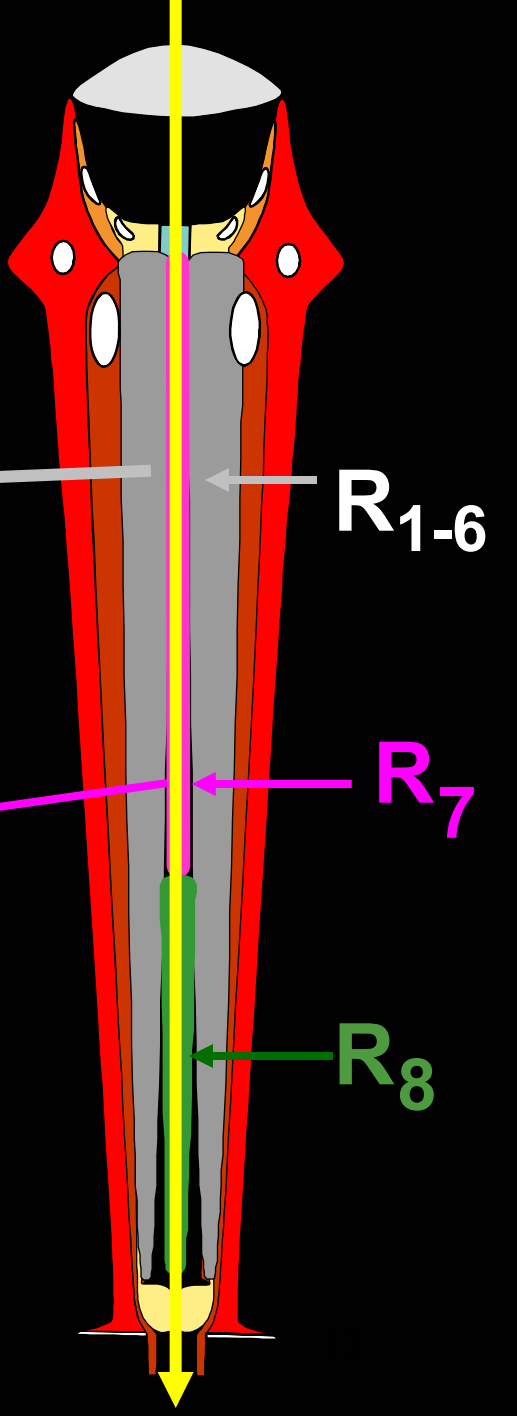


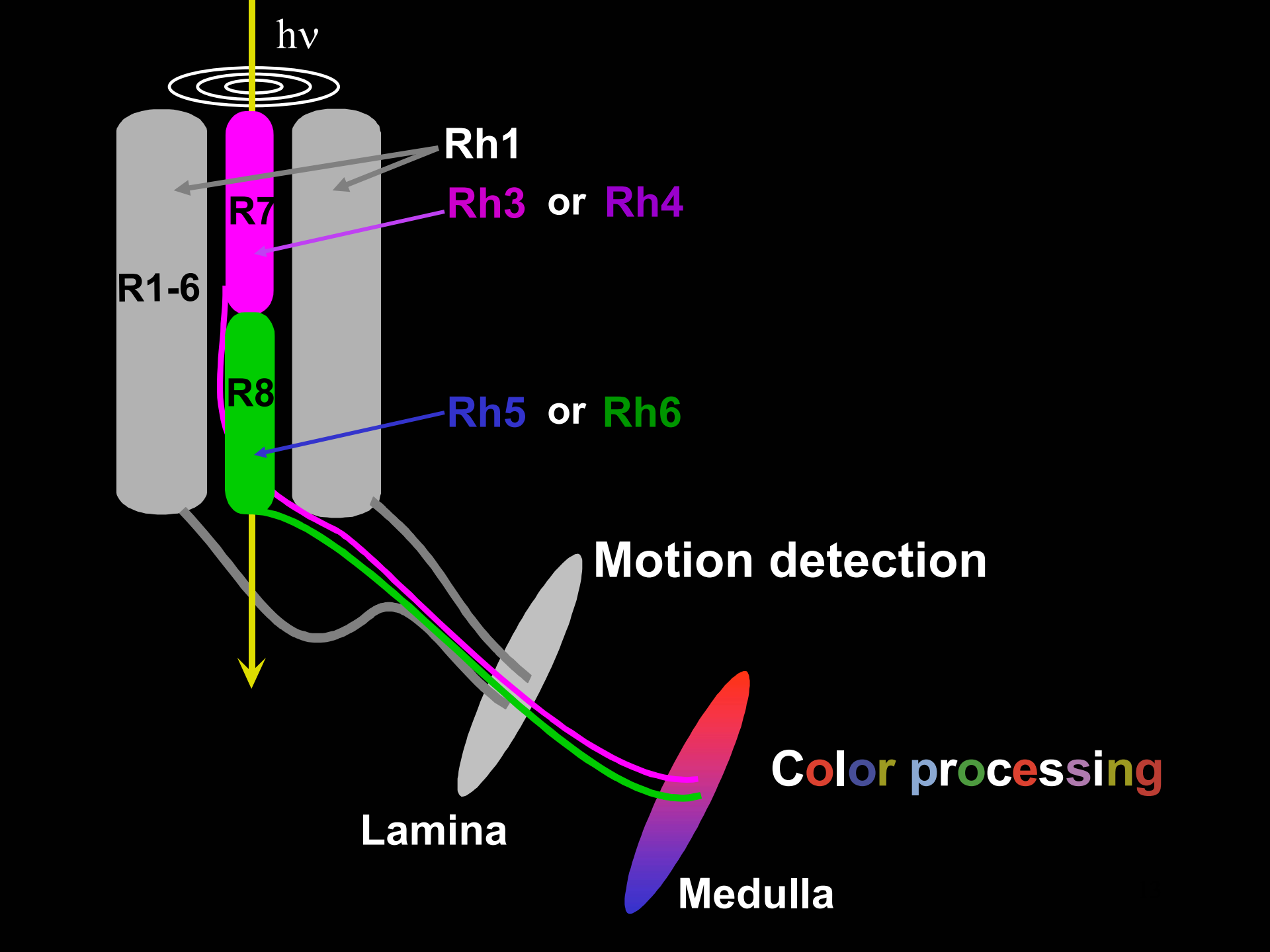


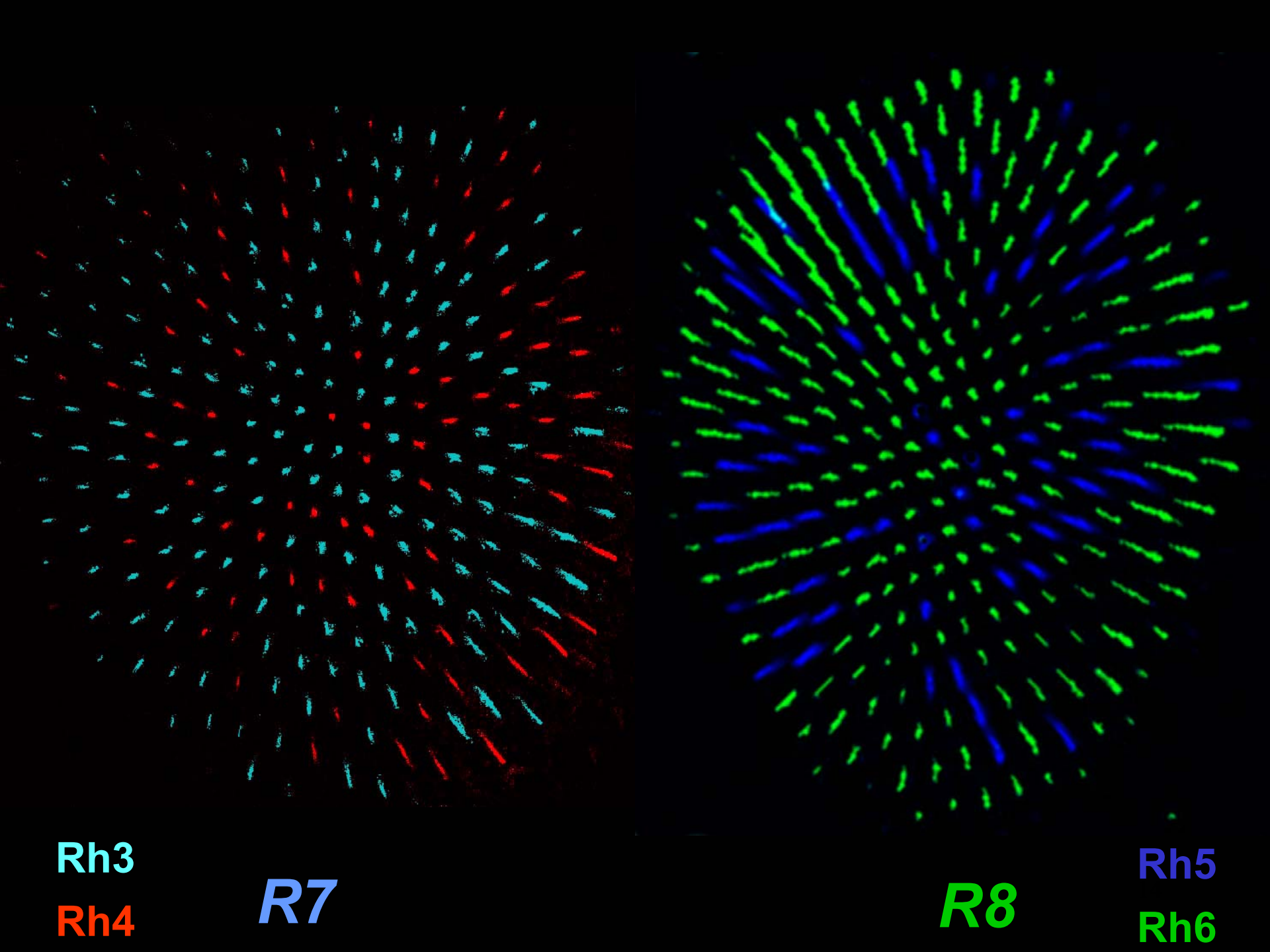

UV
Blue
UV
Blue
UV
Green
Blue
Red
UV
Blue

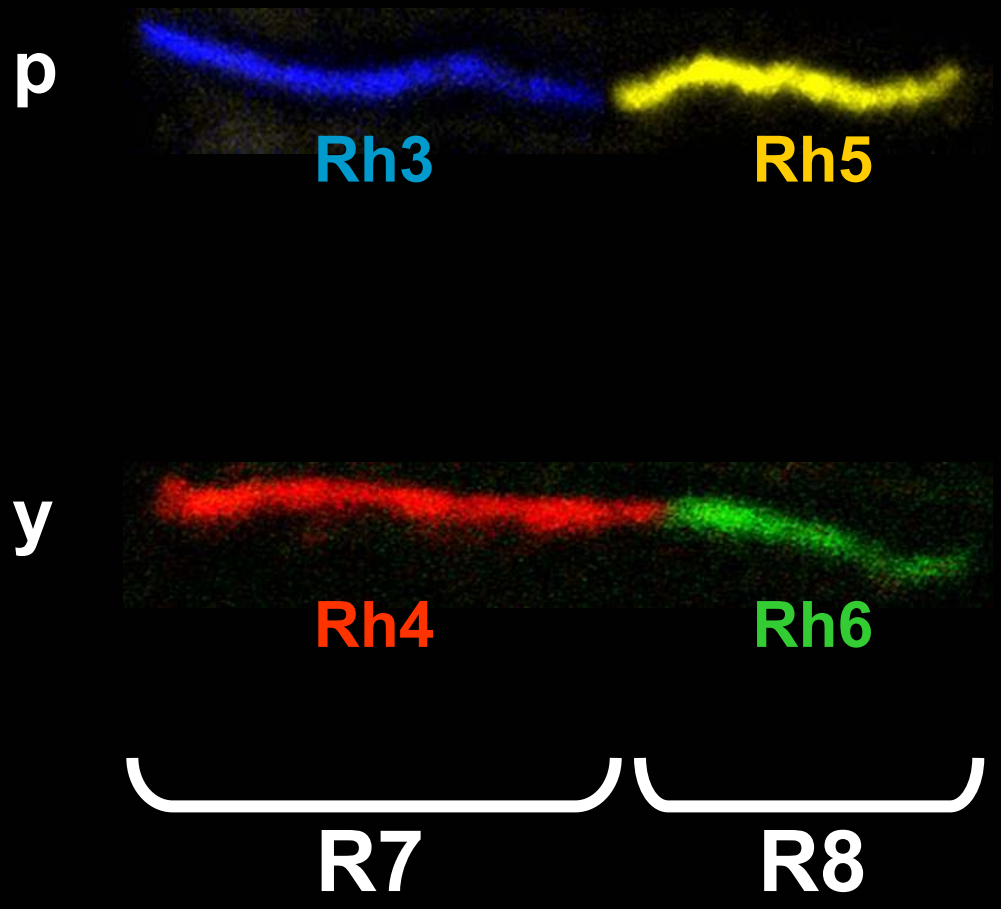


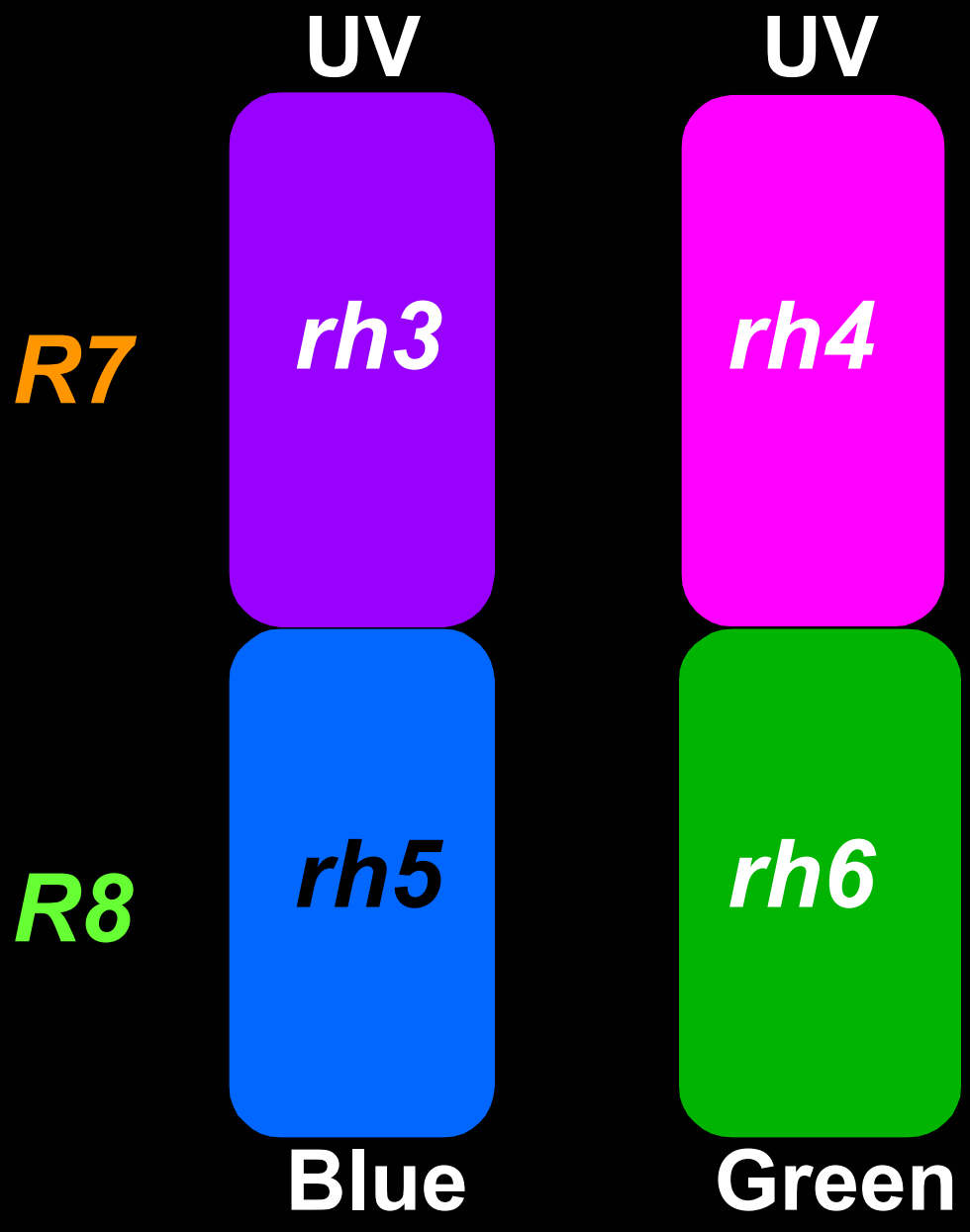

3
4
2
5
7
1
6

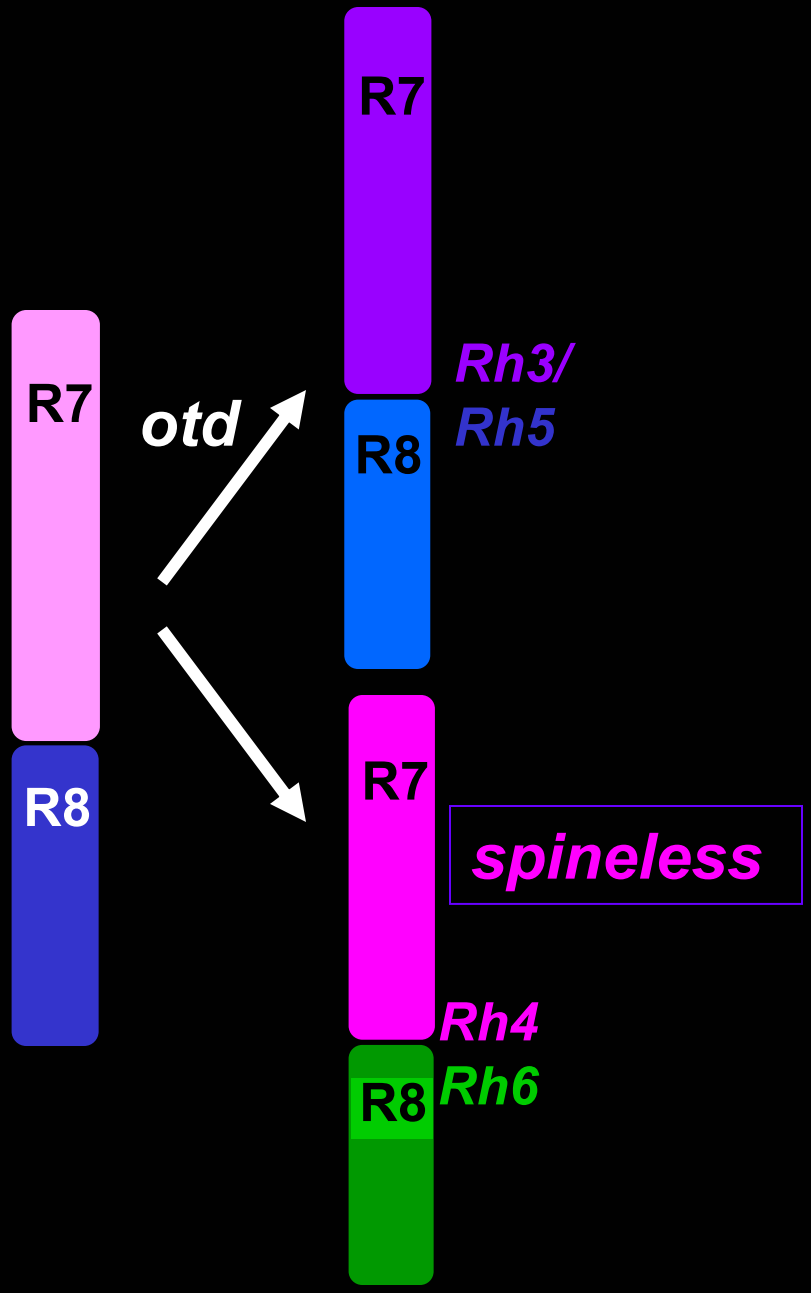

R1-6
R7
R8


hν
Rh1
Rh3 or Rh4
R7
R1-6
R8
Rh5 or Rh6
Motion detection
Color processing
Lamina
Medulla

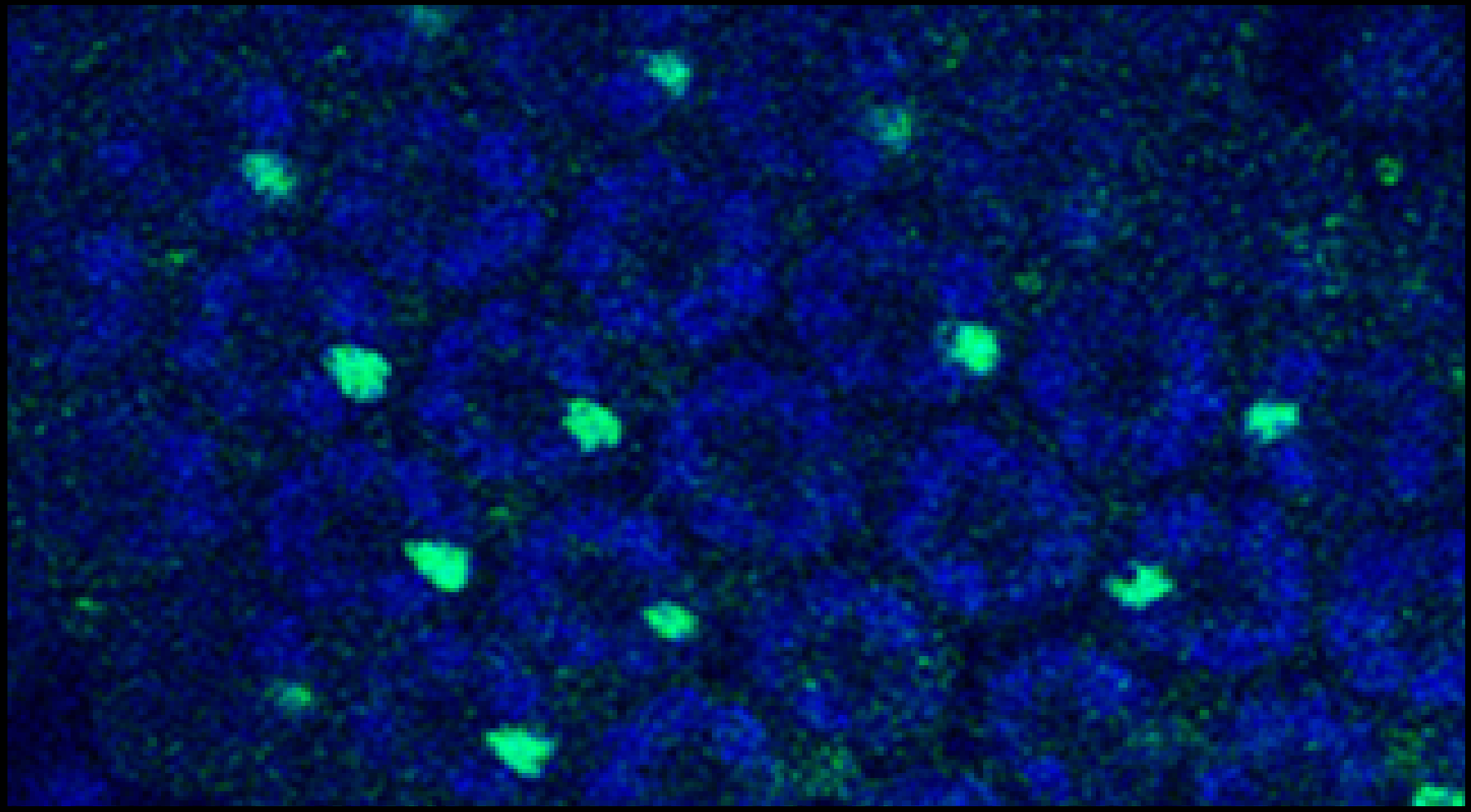

Rh3
Rh4
R7
R8
Rh5
Rh6


p
Rh3
Rh5
y
Rh4
Rh6
R7
R8


UV
UV
R7
rh3
rh4
R8
rh5
rh6
Blue
Green


R7
R8
otd
R7
R8
Rh3/
Rh5
R7
spineless
Rh4
R8
Rh6

spineless

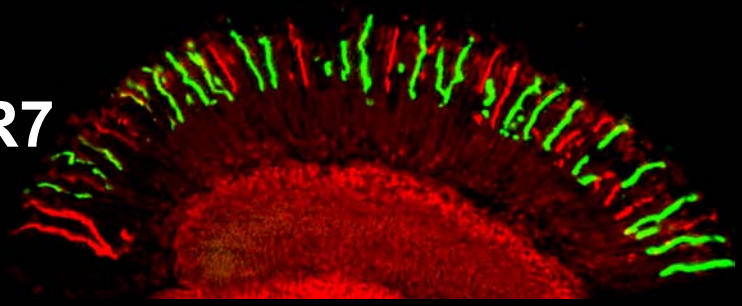


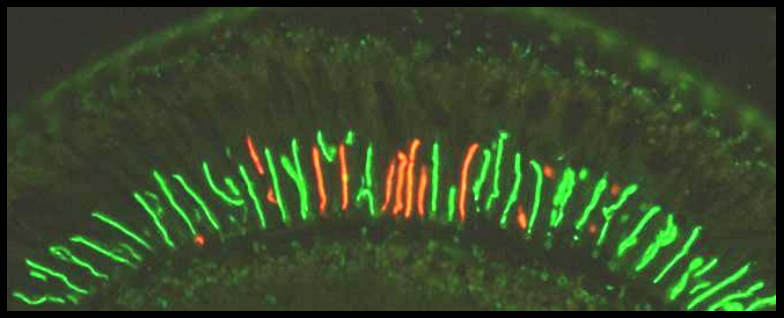
Bob Johnston

spineless is necessary for the *rh4*/*rh6* fate

Rh3 Rh4 *wt* Rh5 Rh6

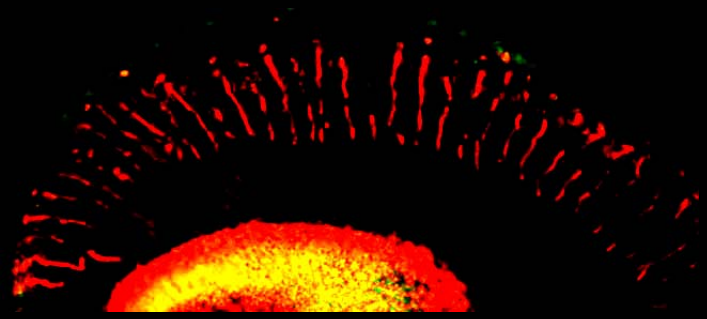
R7

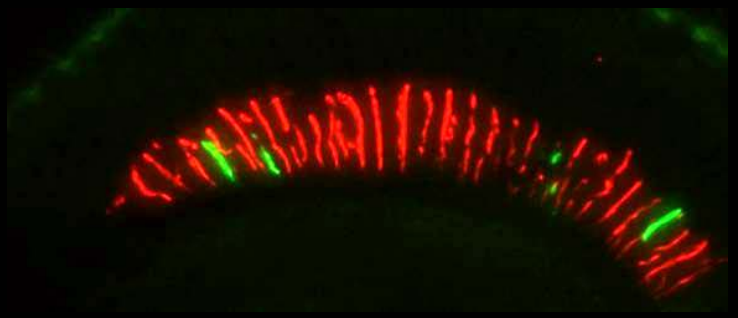




R8

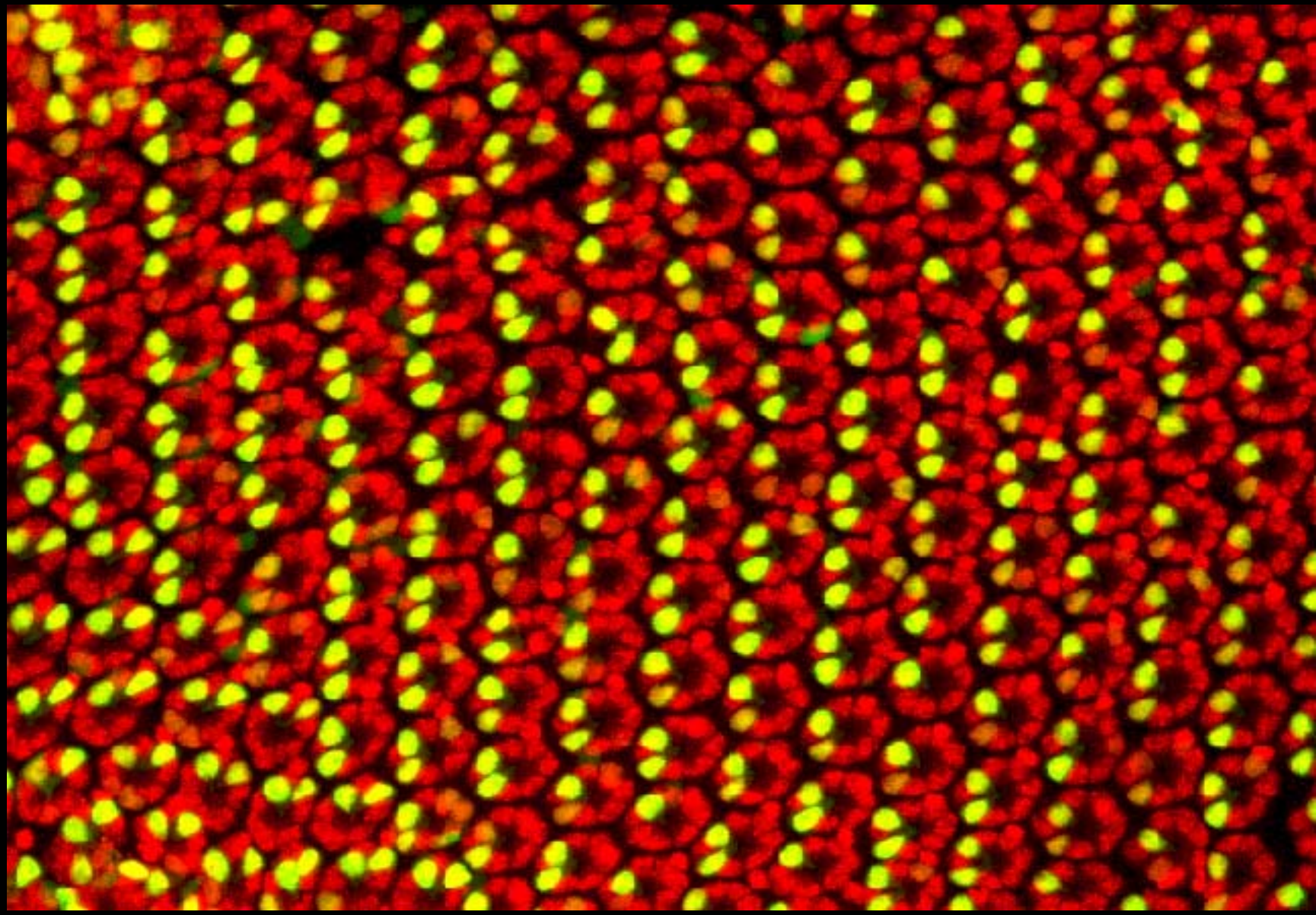
ss



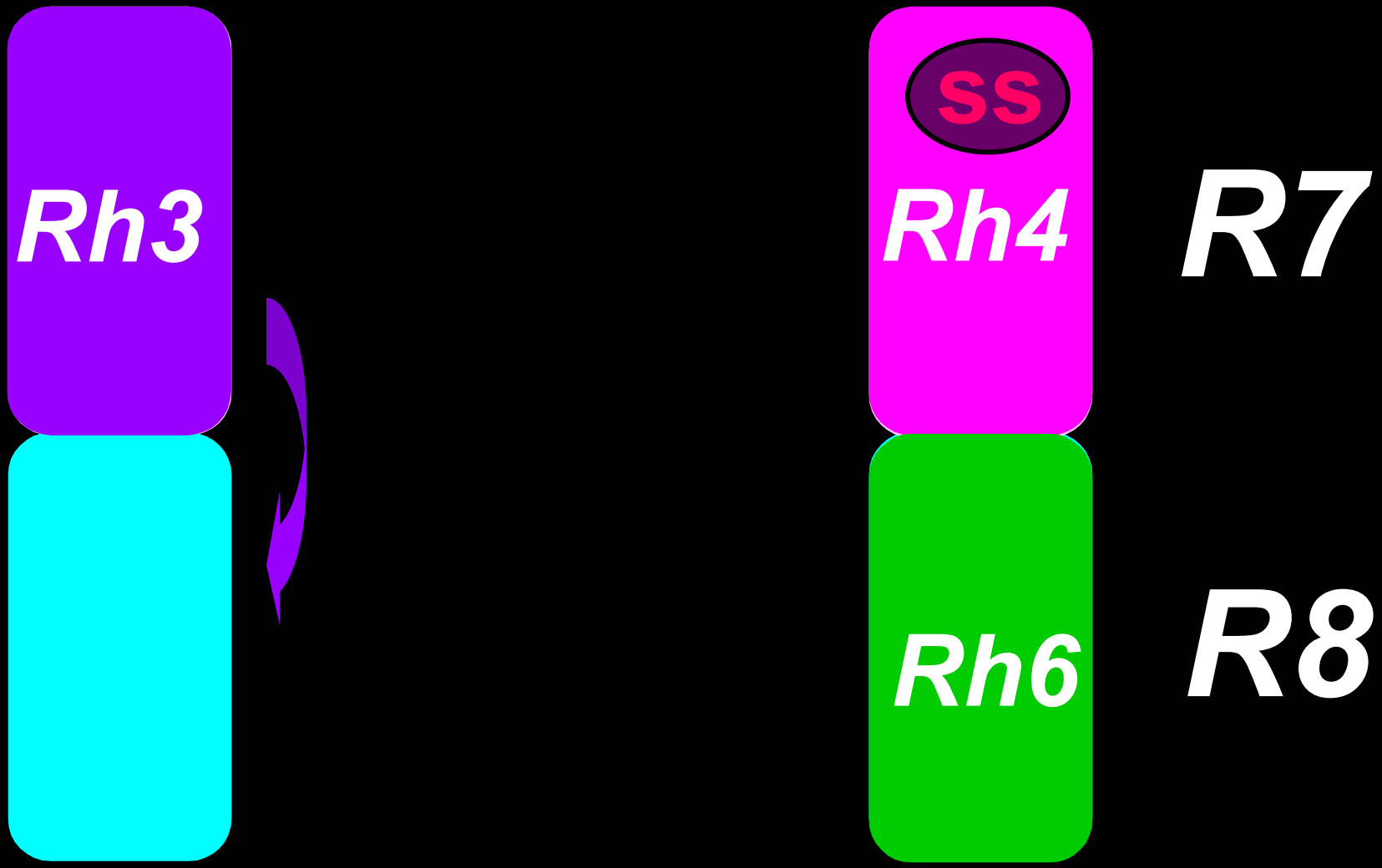


R7 R8

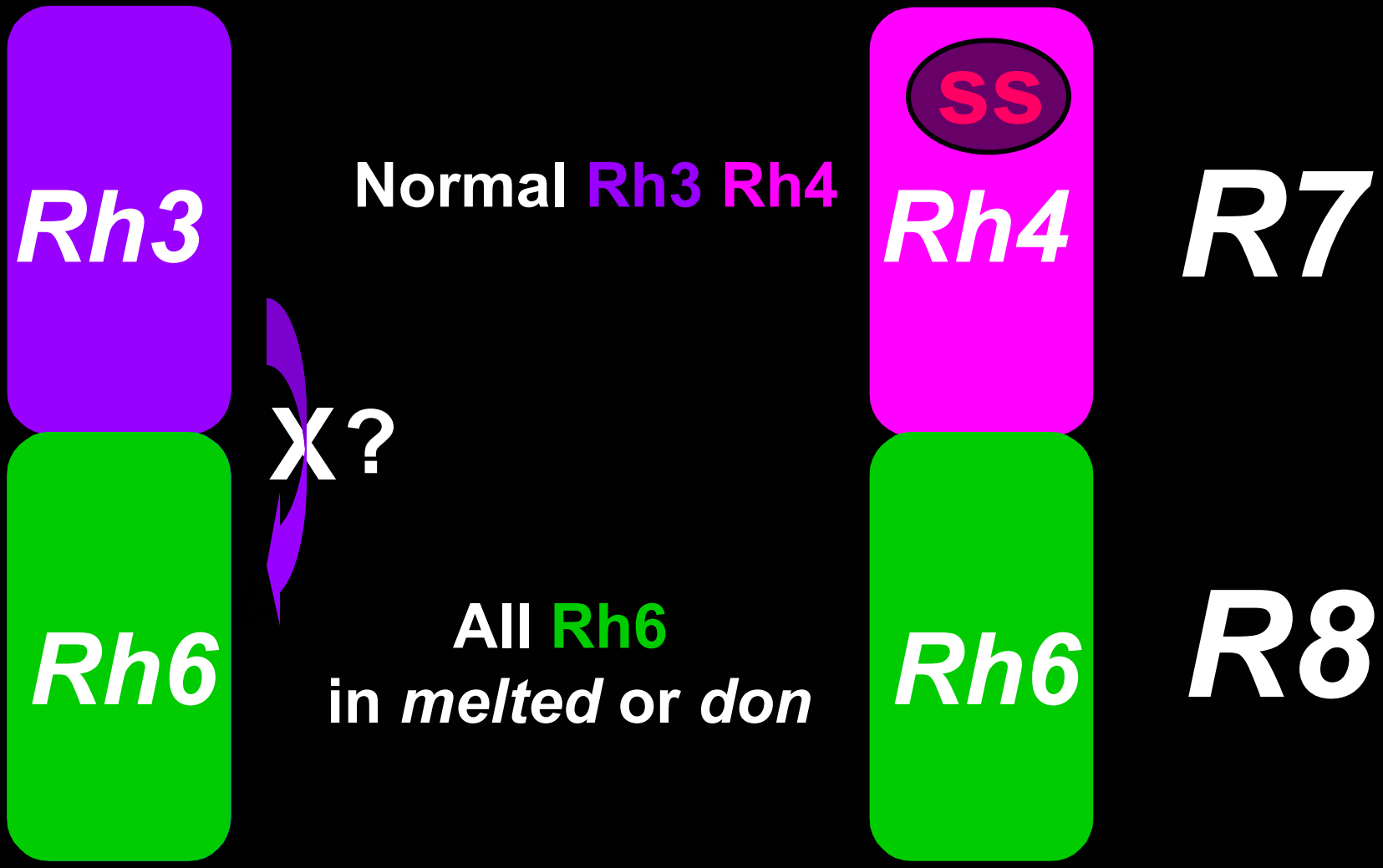
Mathias Wernet



91% on, 9% off in R7

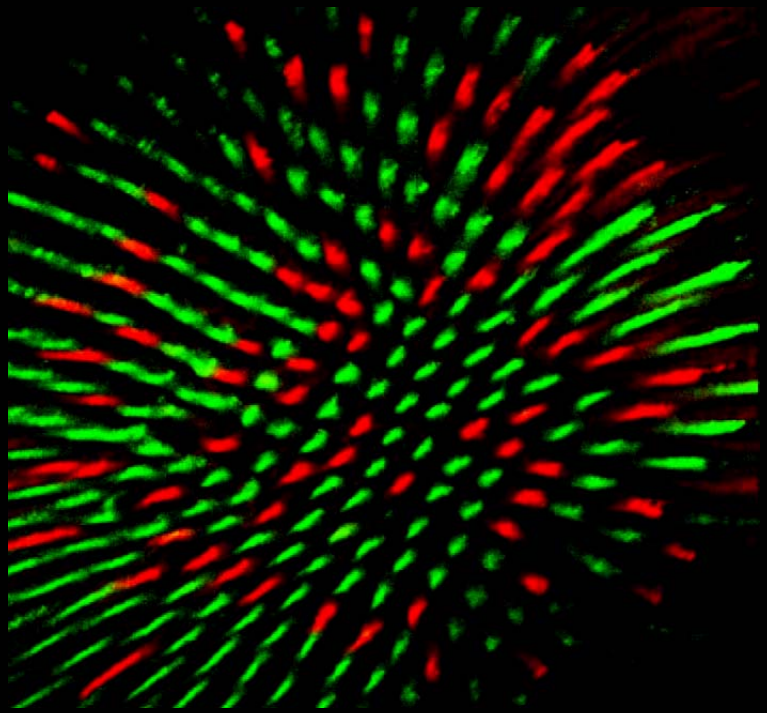

Rh3
SS
Rh4
R7
Rh6
R8

What is the signal between R7 and R8?

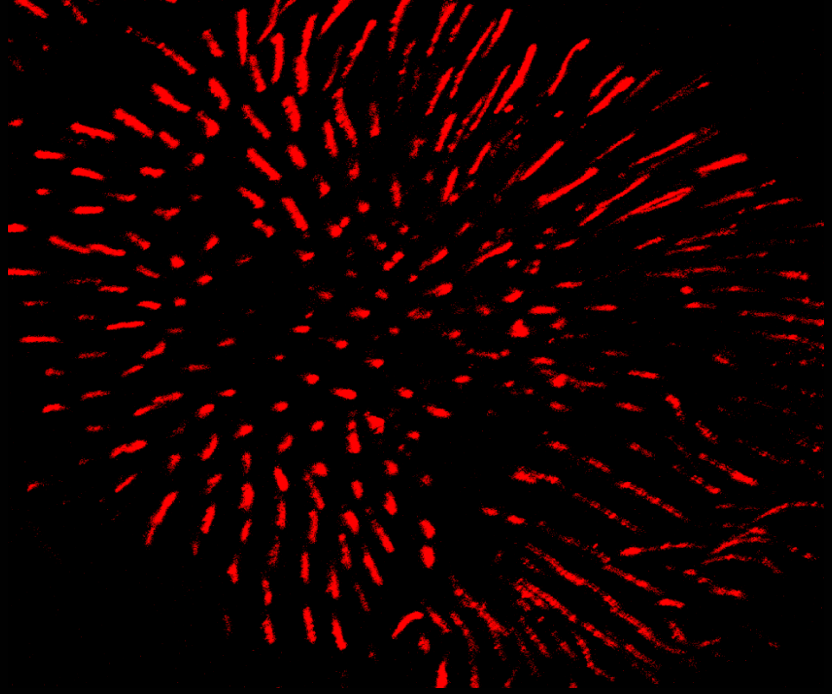


Rh3
Rh5
Normal Rh3 Rh4
All Rh5: Lats/warts
SS
Rh4
Rh5
R7
R8

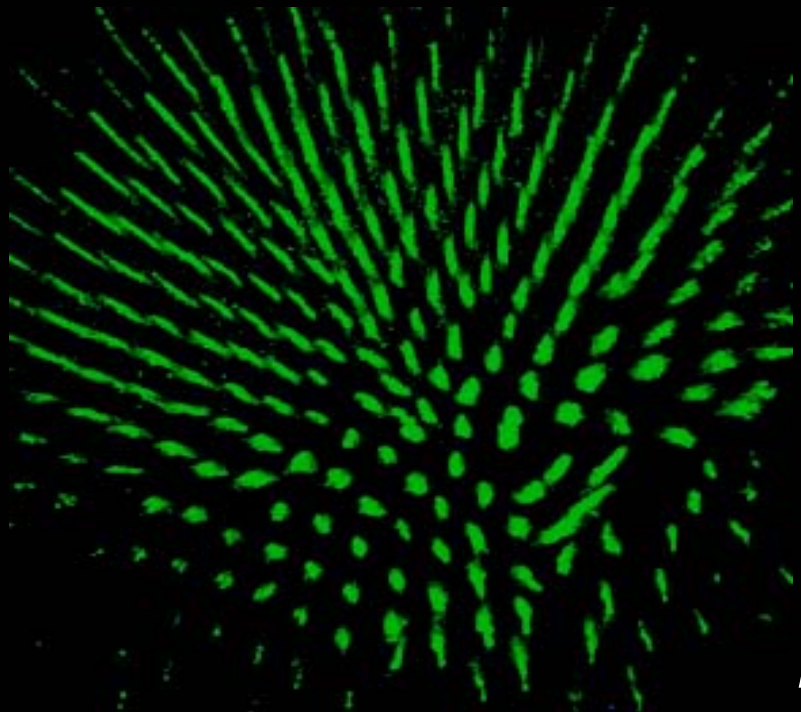
Rh5 Rh6



wt

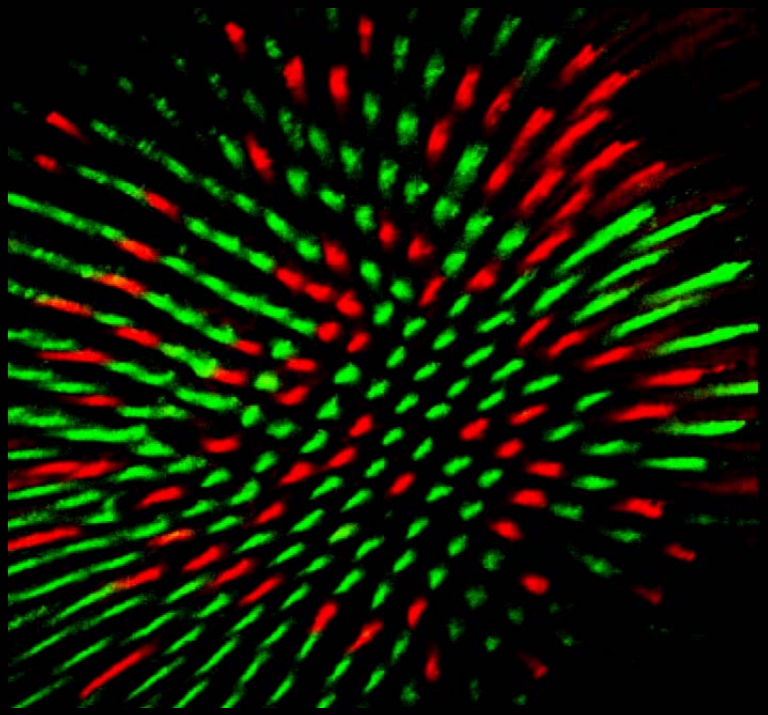


warts

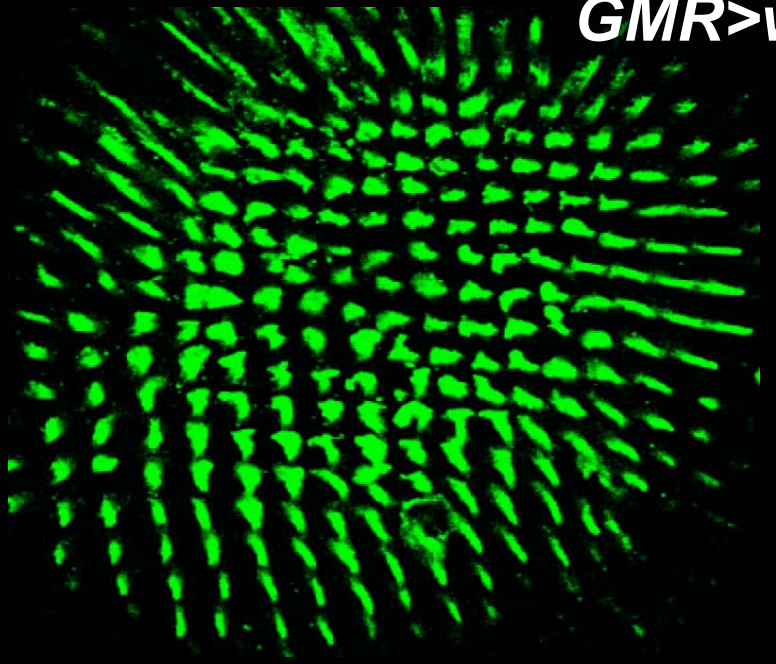


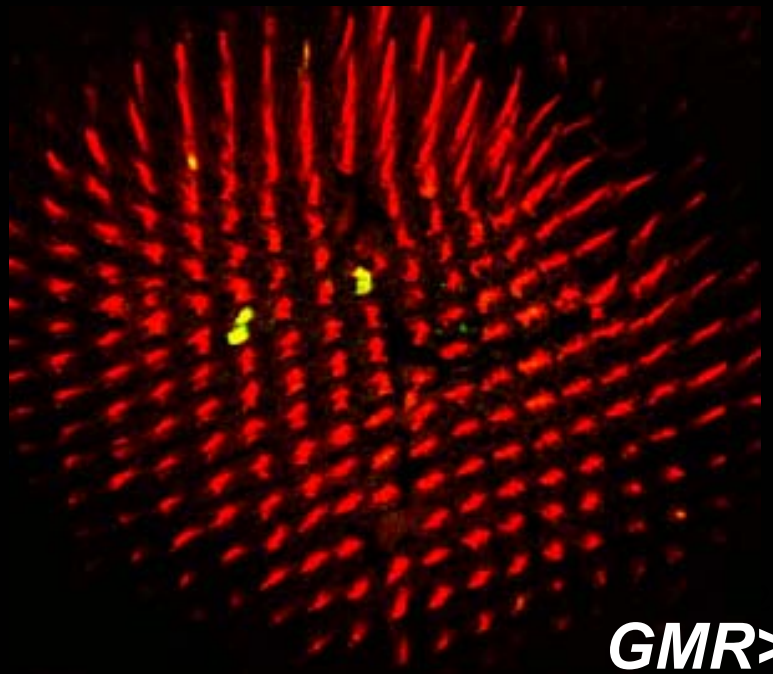
melted

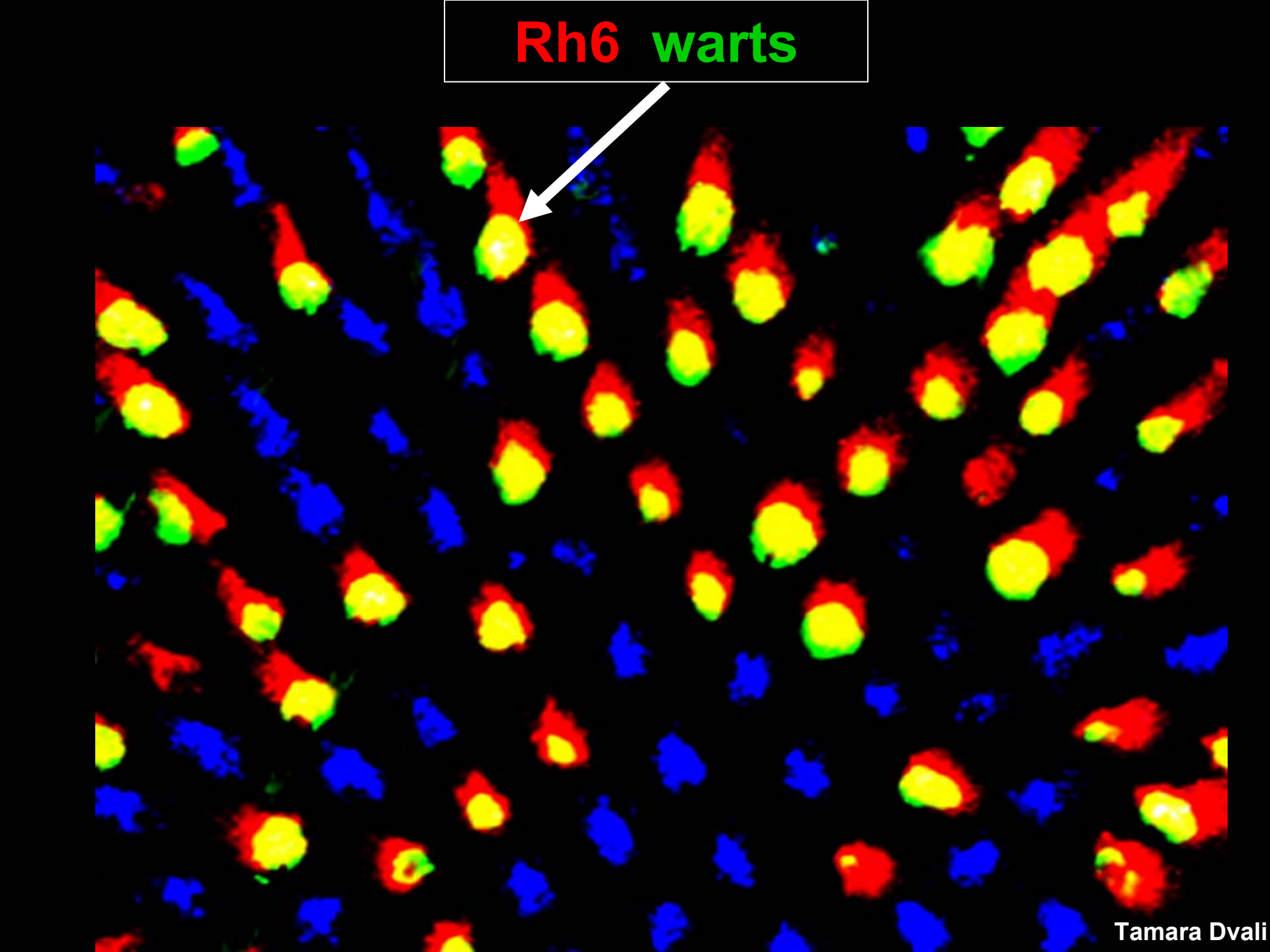
Tamara Dvali

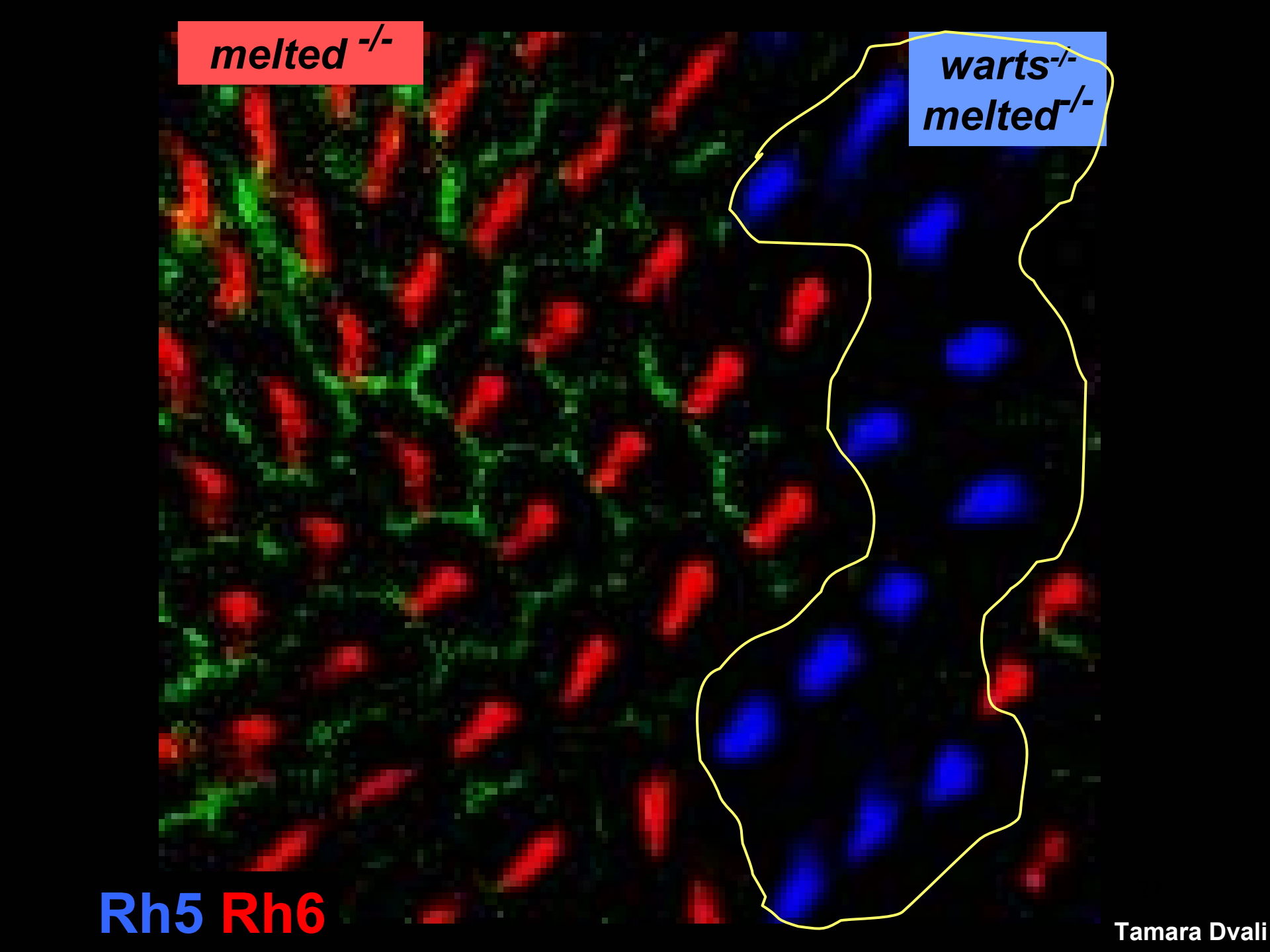


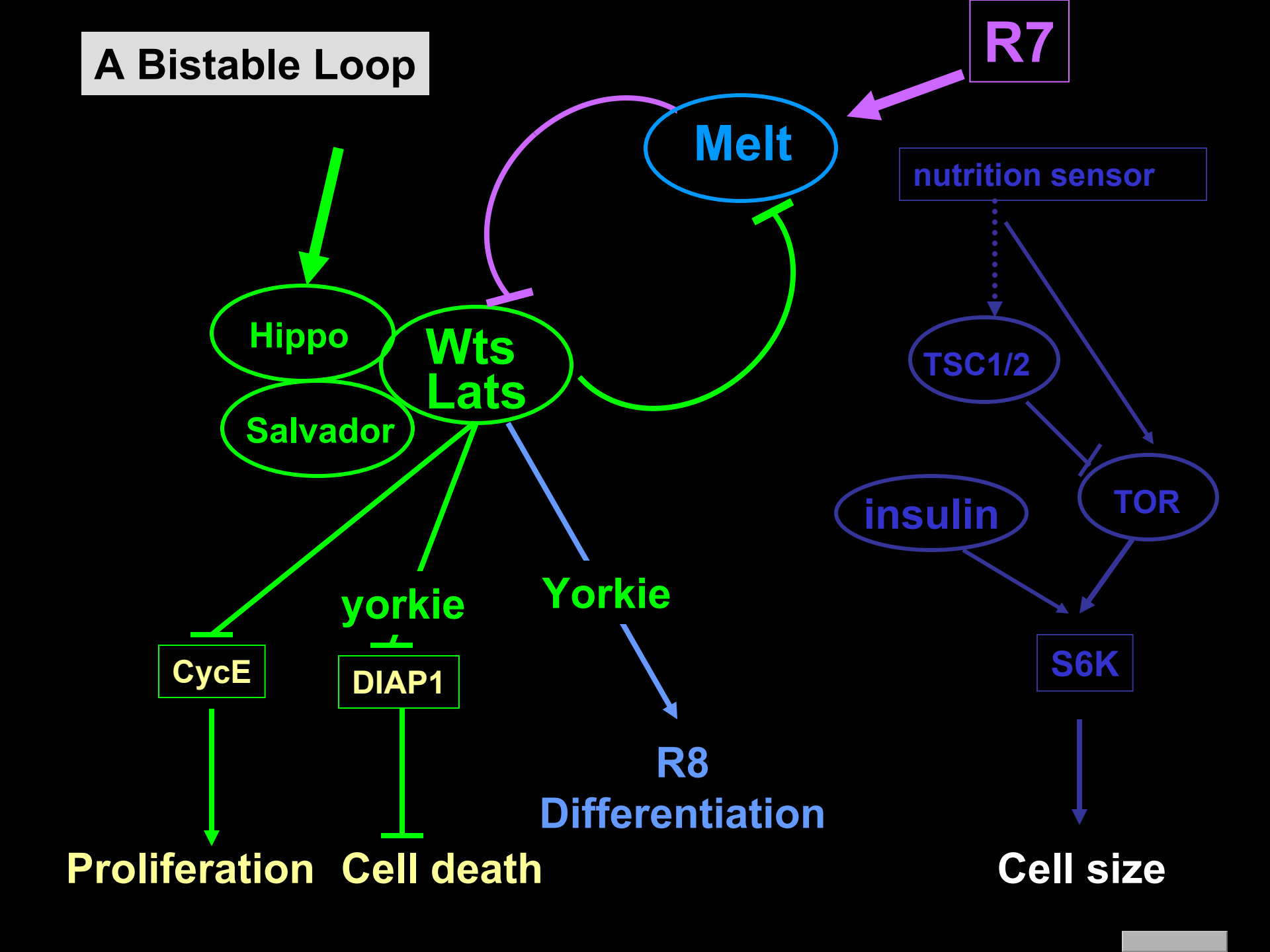
wt



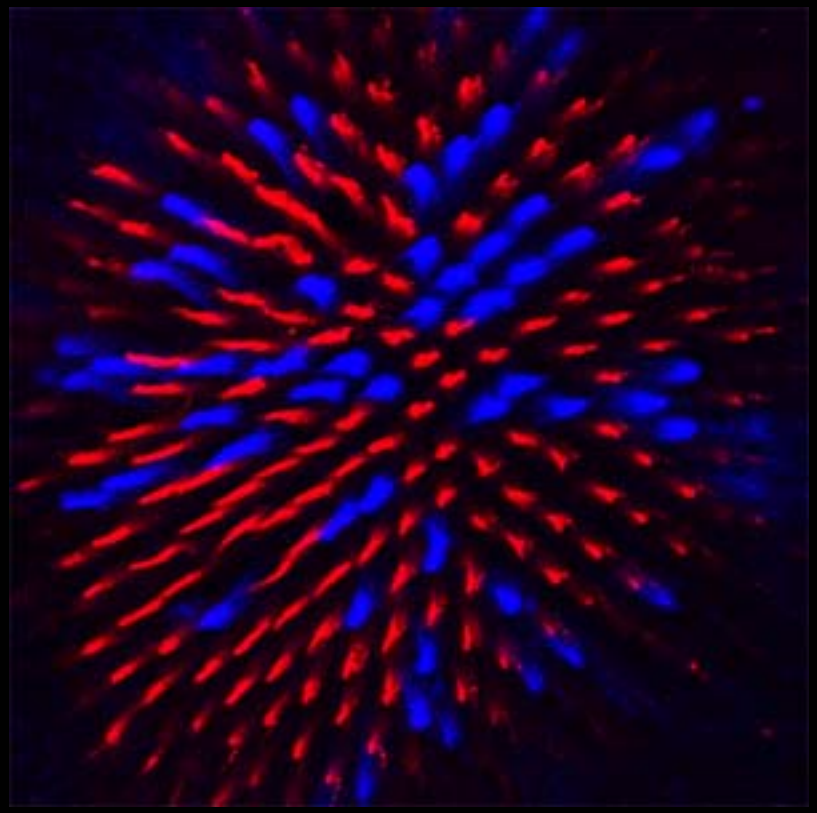


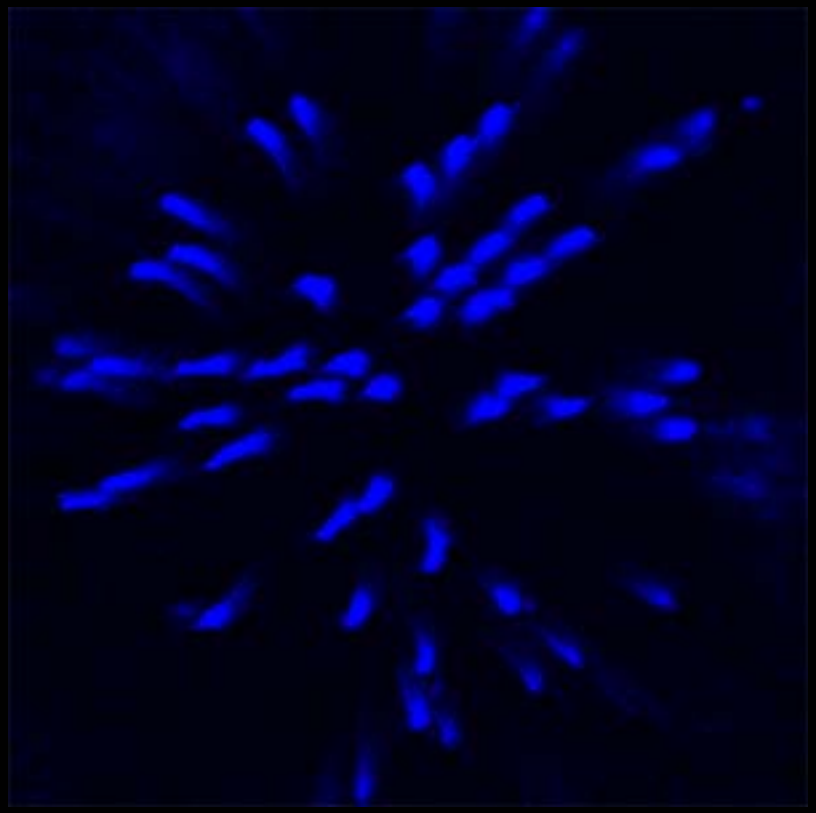

Rh6 warts
Tamara Dvali


melted -/-
warts-/-
melted-/-
Rh5 Rh6
Tamara Dvali


A Bistable Loop
R7
Melt
nutrition sensor
Hippo
Wts
Lats
Salvador
TSC1/2
TOR
insulin
yorkie
Yorkie
CycE
DIAP1
S6K
R8
Differentiation
Proliferation
Cell death
Cell size

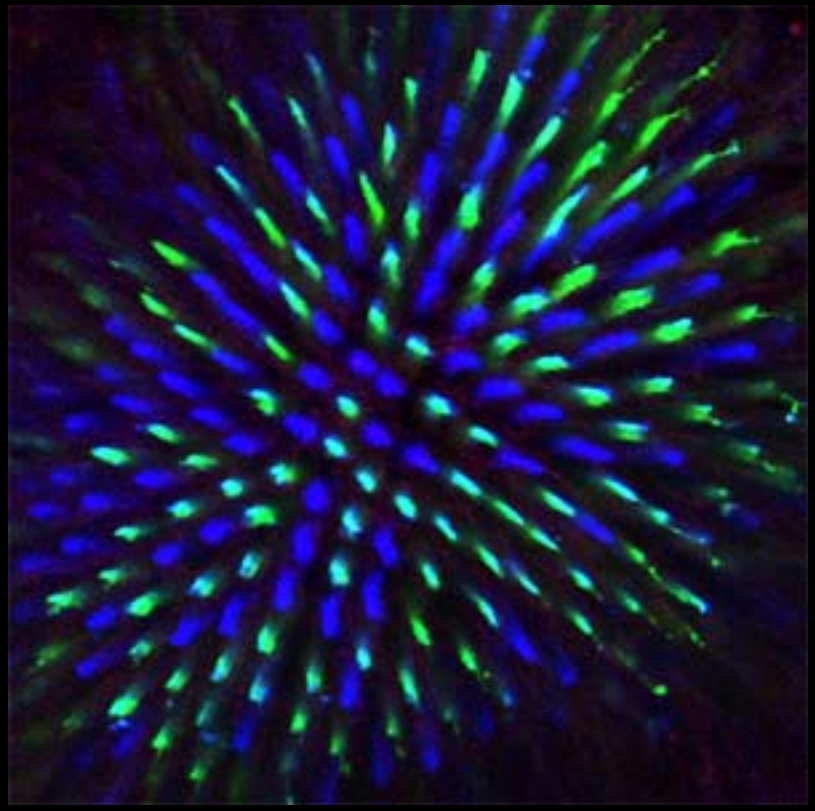
Are Rhodopsins involved in the fate of photoreceptors?

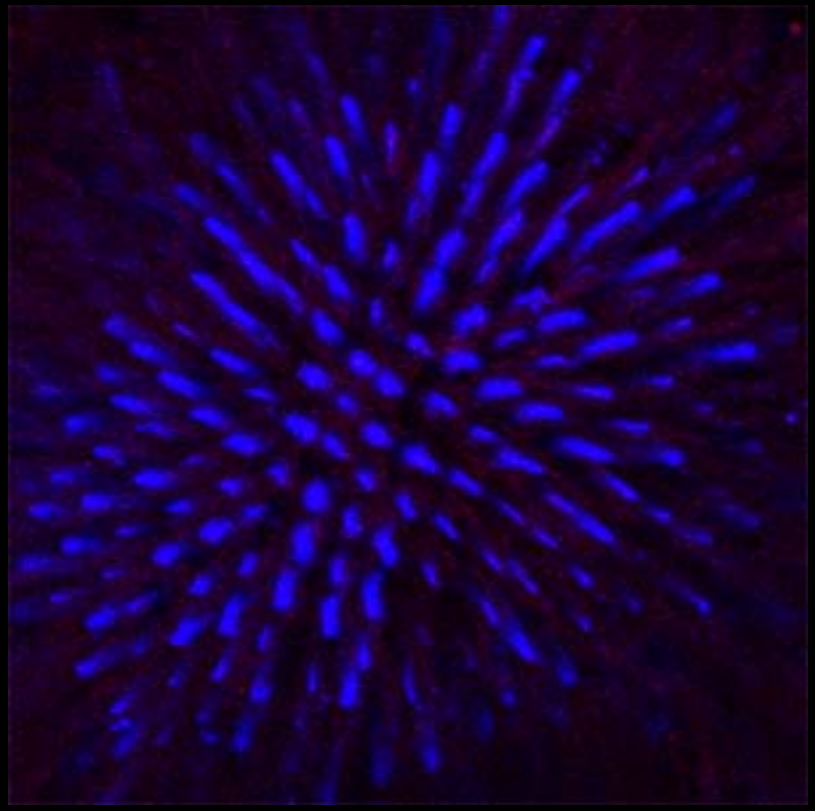




Rh5
Rh6

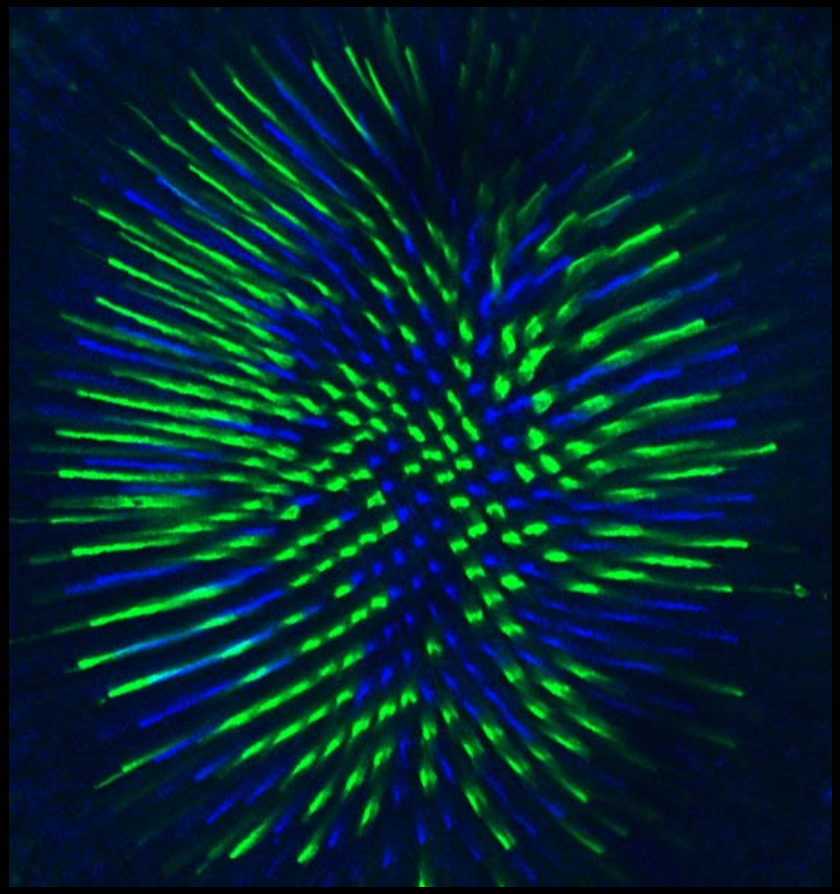
rh6[1] mutant: co-expression of Rh5 & Rh6-GFP

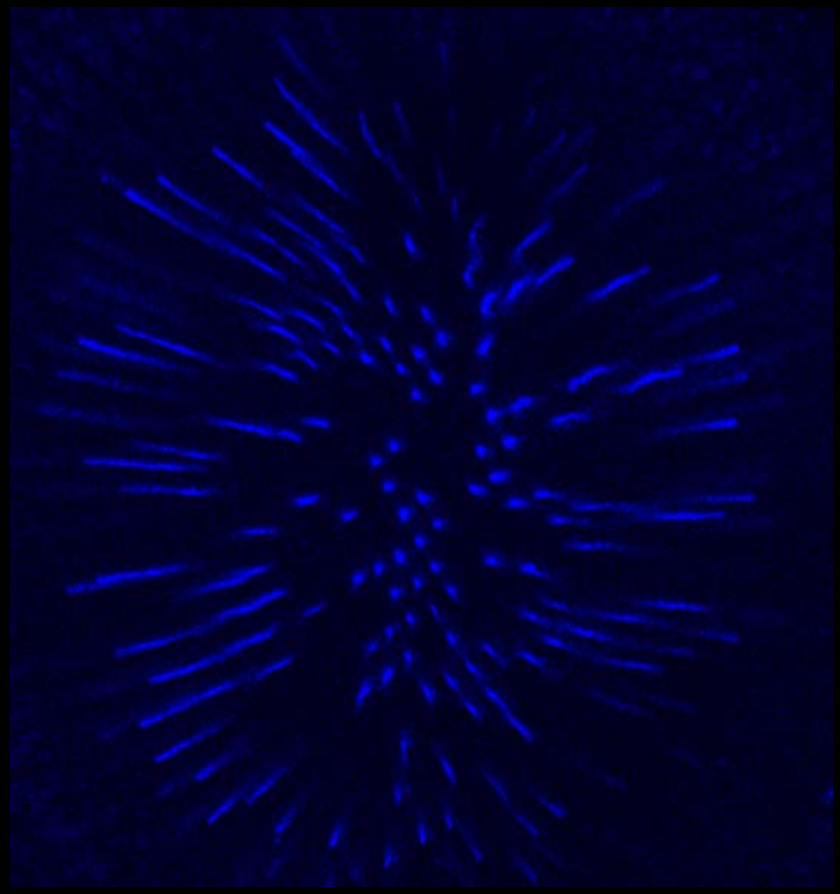




Rh5
Rh6>GFP

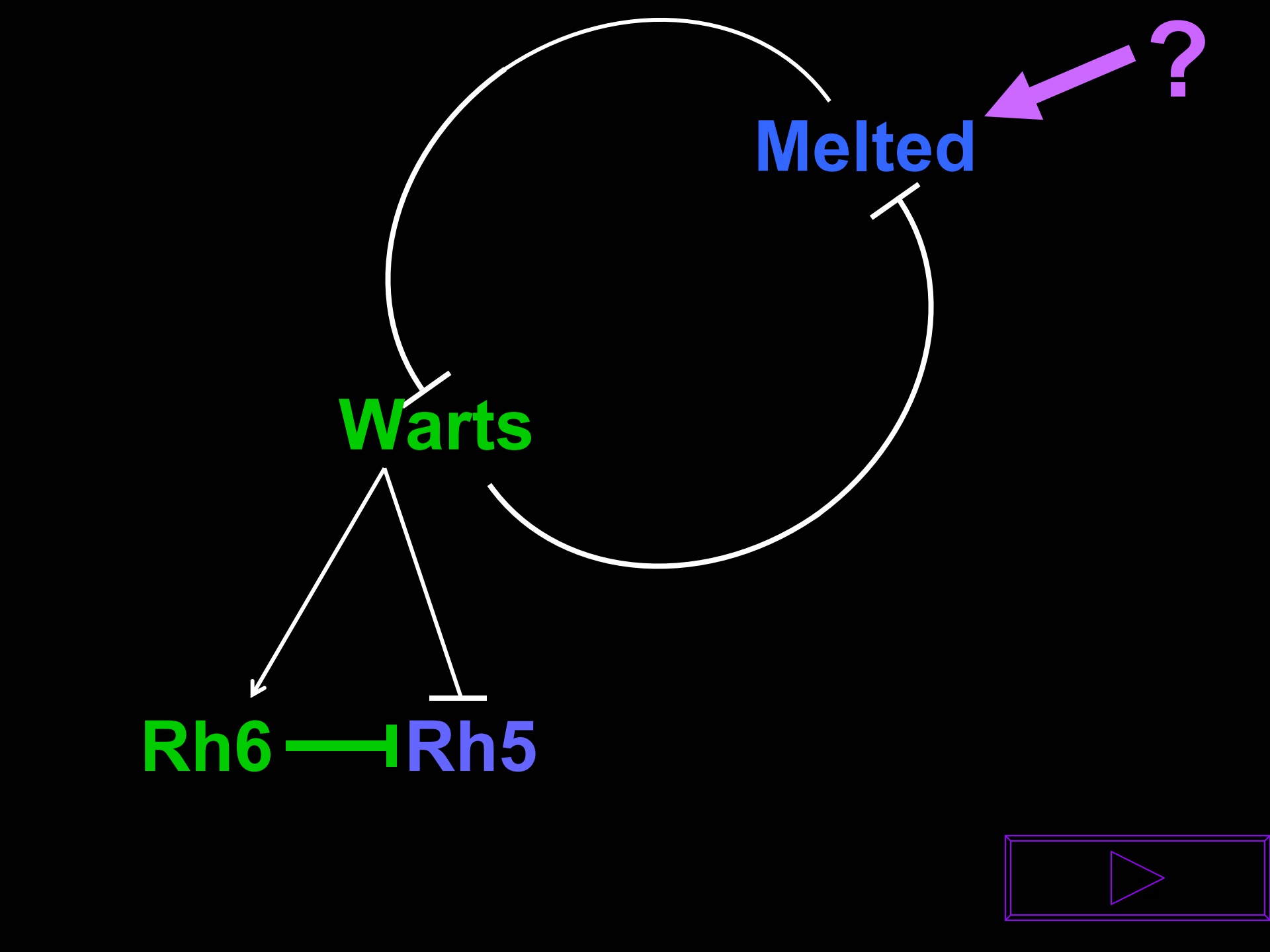
Rescue of rh6 mutants by *rh6*>Rh6

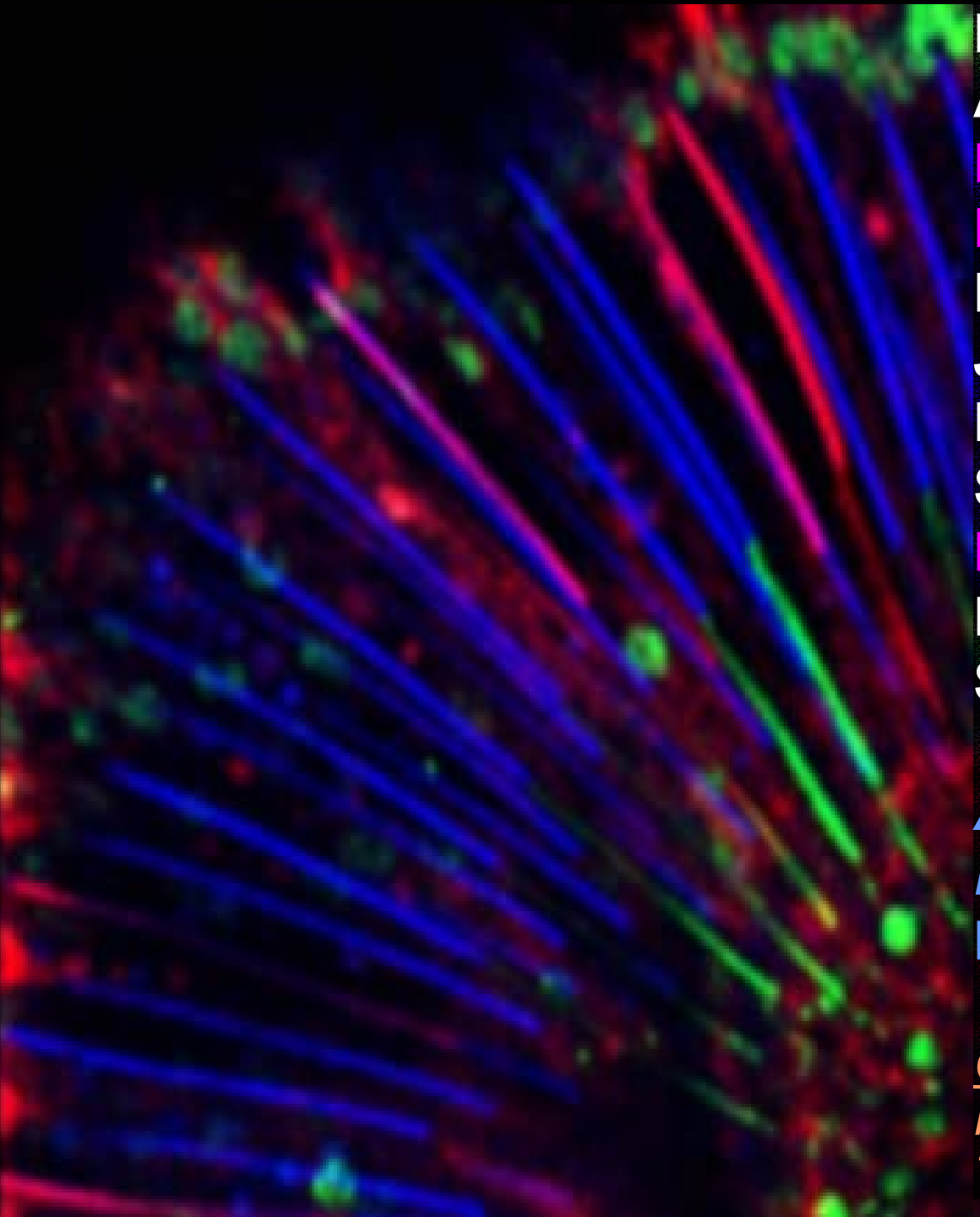




Rh5

rh6>Rh6 & GFP


?
Melted
Warts
Rh6
Rh5



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