Mechano-transduction and prepatterning in Drosophila

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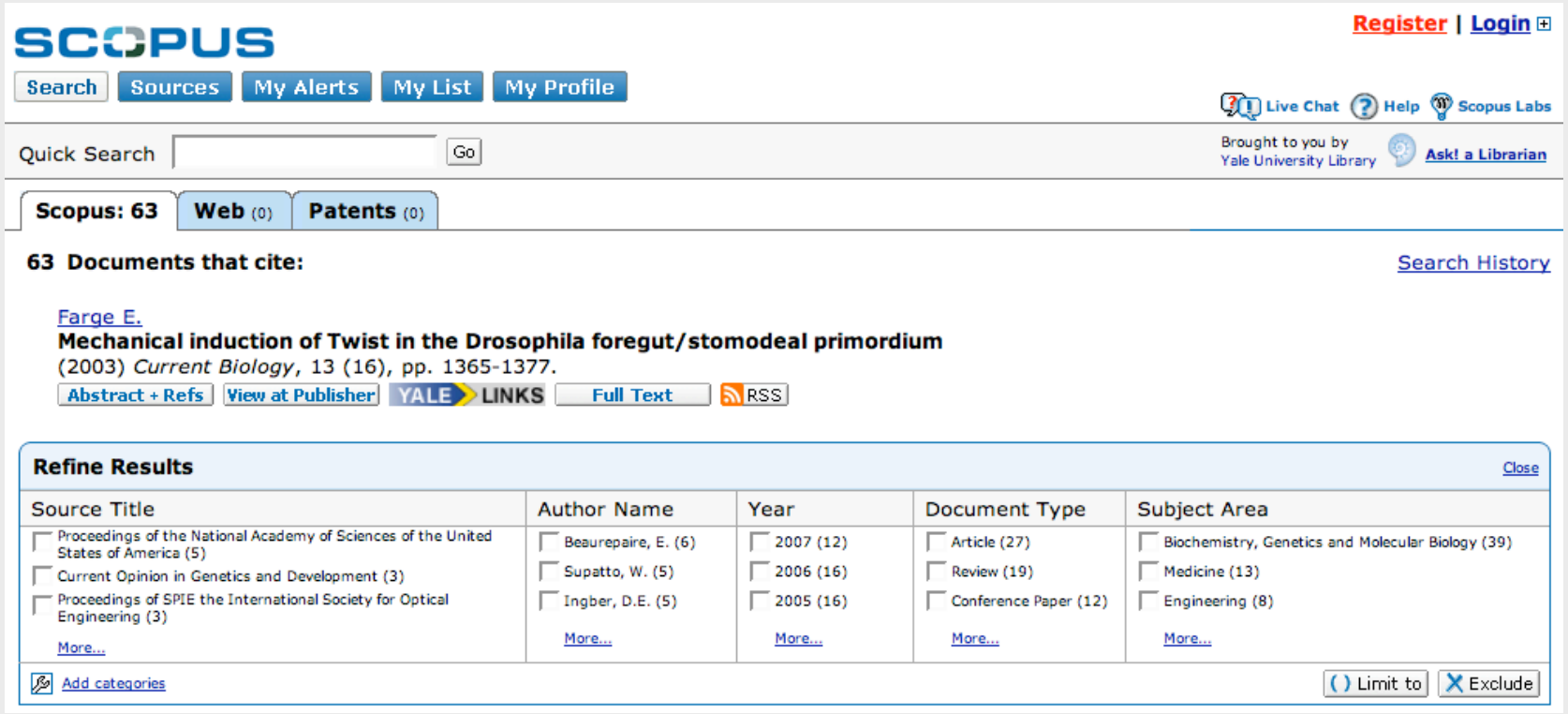
Institut Curie UMR 168 - Physico-Chimie,
Mechanics and Genetics of Embryonic and
Tumoral Development

Some memories from the first exercice …

Some memories from the first exercice …

… In December, 2007



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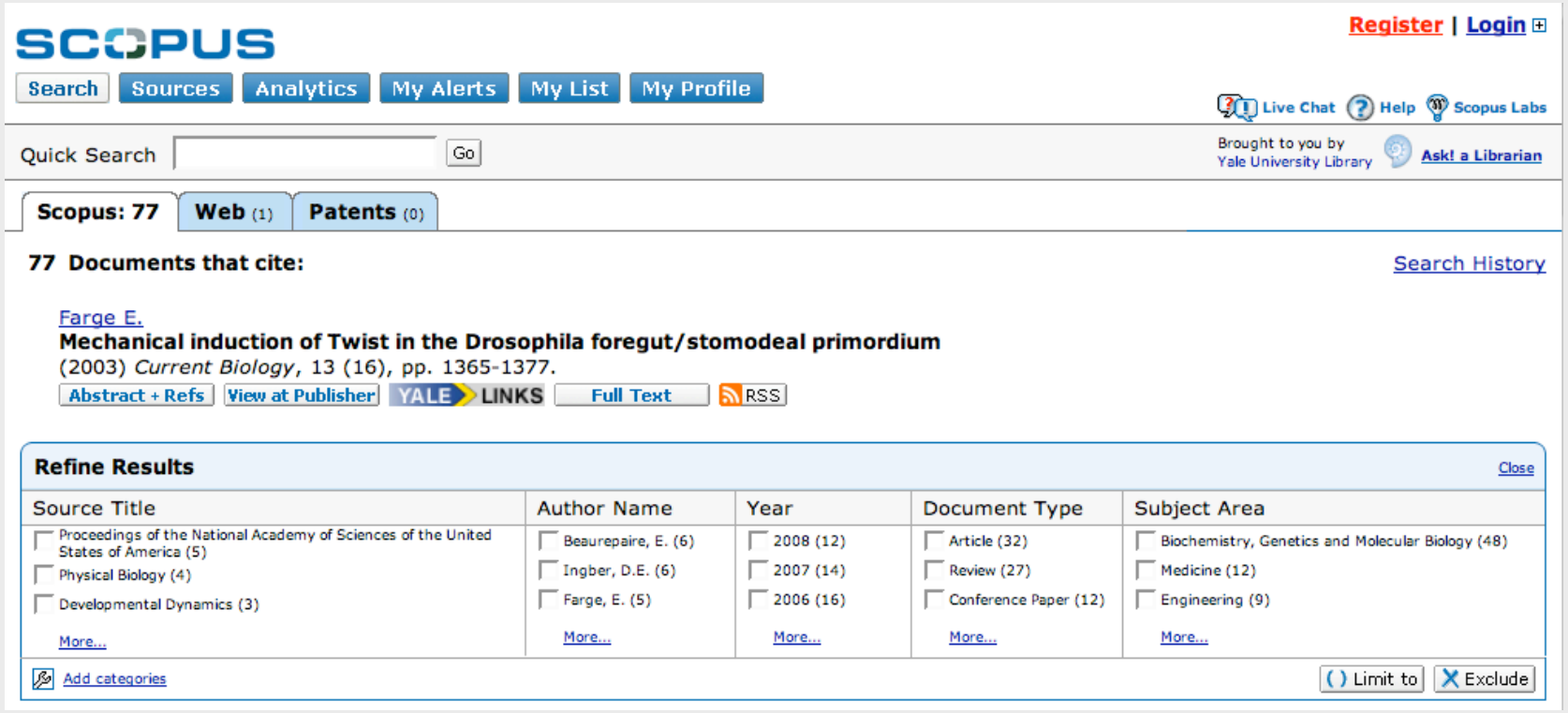

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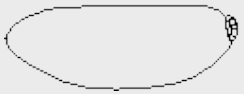
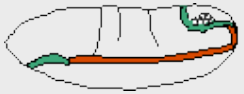
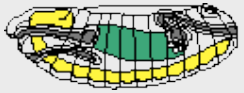
	Stage	Time	Events
	1-4	00h00-02h10	Cleavage (divisions)
	5	02h10-02h50	Blastoderm cellularizes
	6-7	02h50-03h10	Gastrulation
	8-11	03h10-07h20	Germ-Band Elongates
	12-13	07h20-10h20	Germ-Band Retracts
	14-15	10h20-13h00	Head Involution and dorsal closure
	16-17	13h00-22h00	Differentiation

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During Gastrulation, four major invaginations

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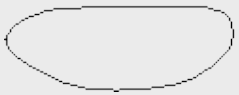
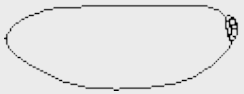
	1-4		e (divisions)
	5		n cellularizes
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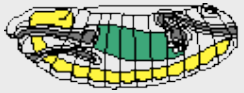	14-15		on and dorsal closure
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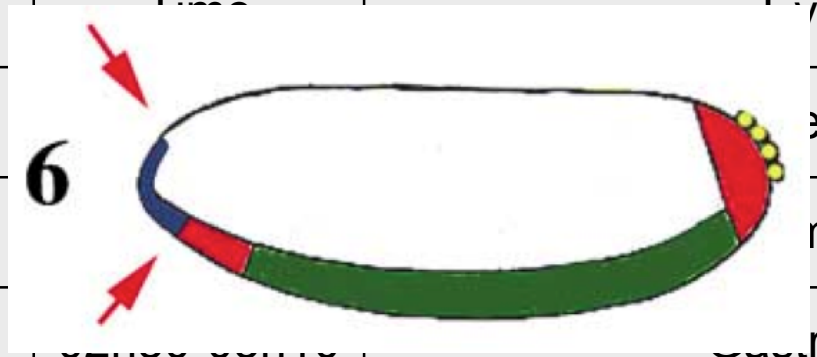

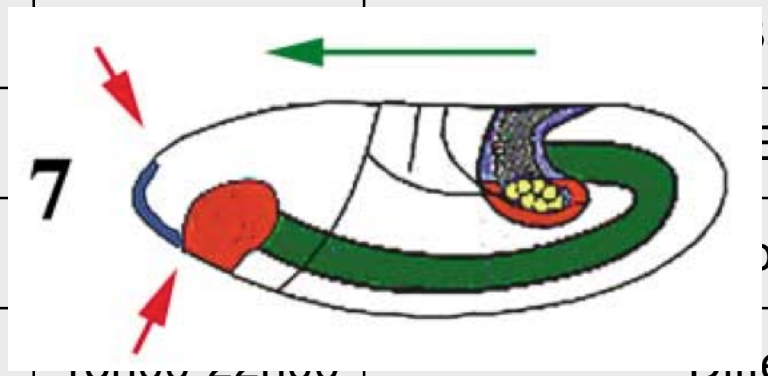

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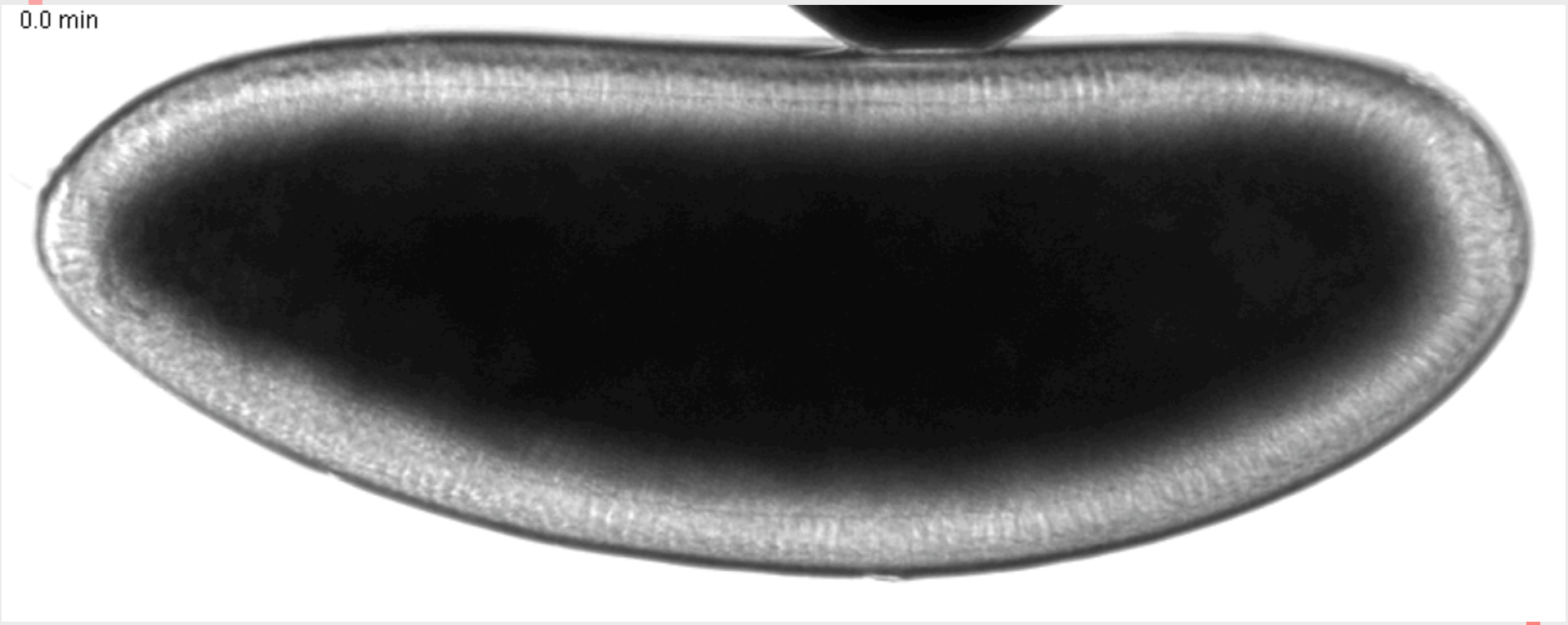

Ventral furrow & anterior midgut; cephalic furrow; proctodeal invagination

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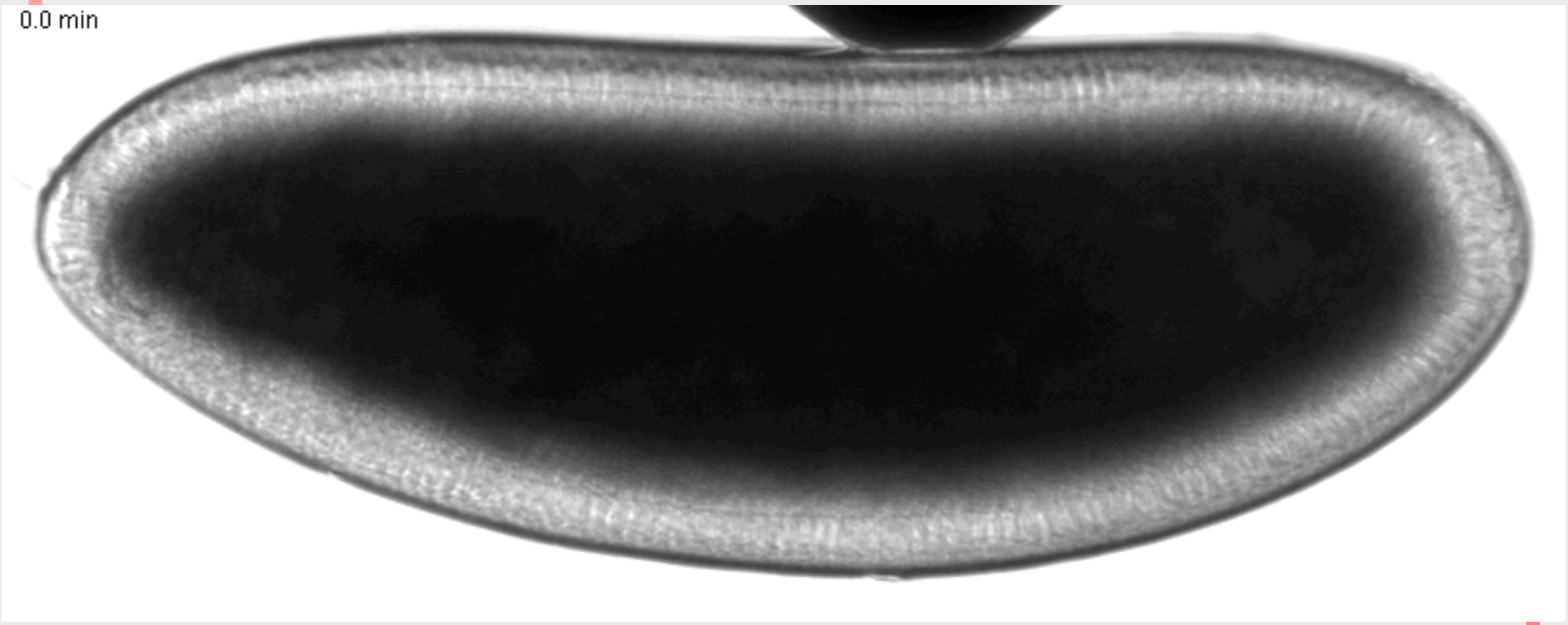

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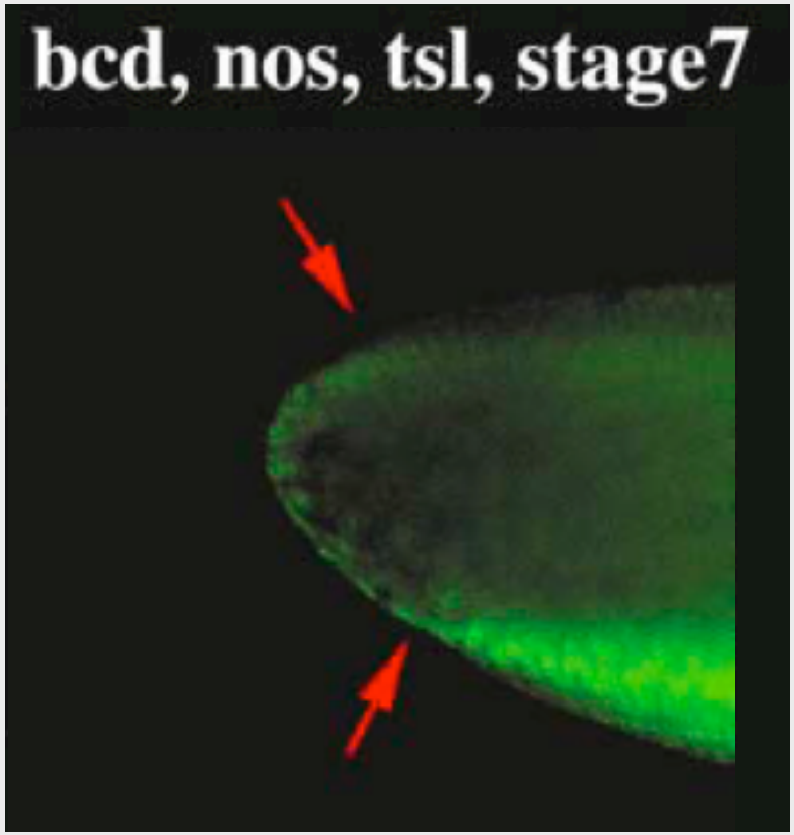
… Results: rescue of Twist expression by poking



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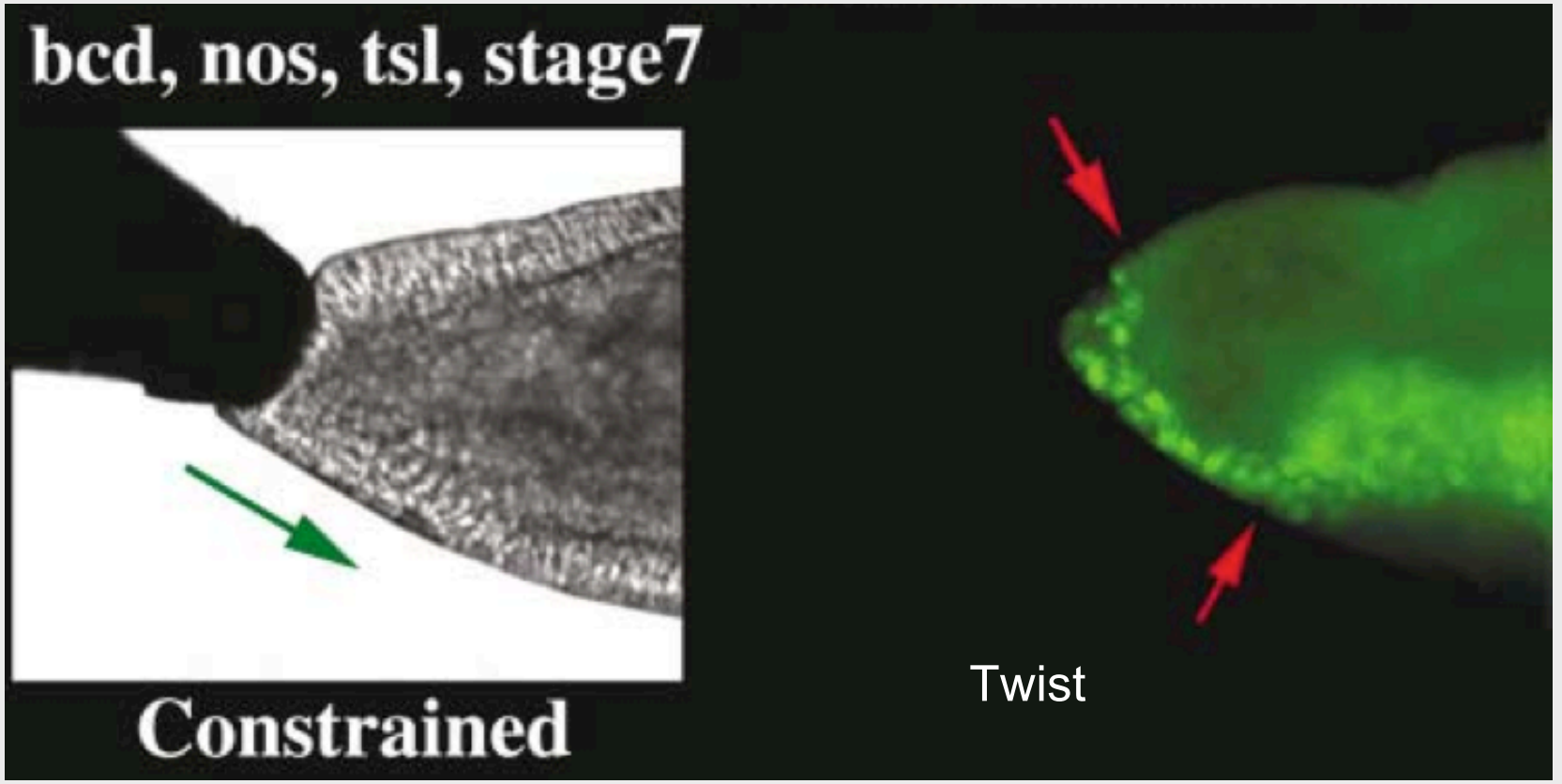

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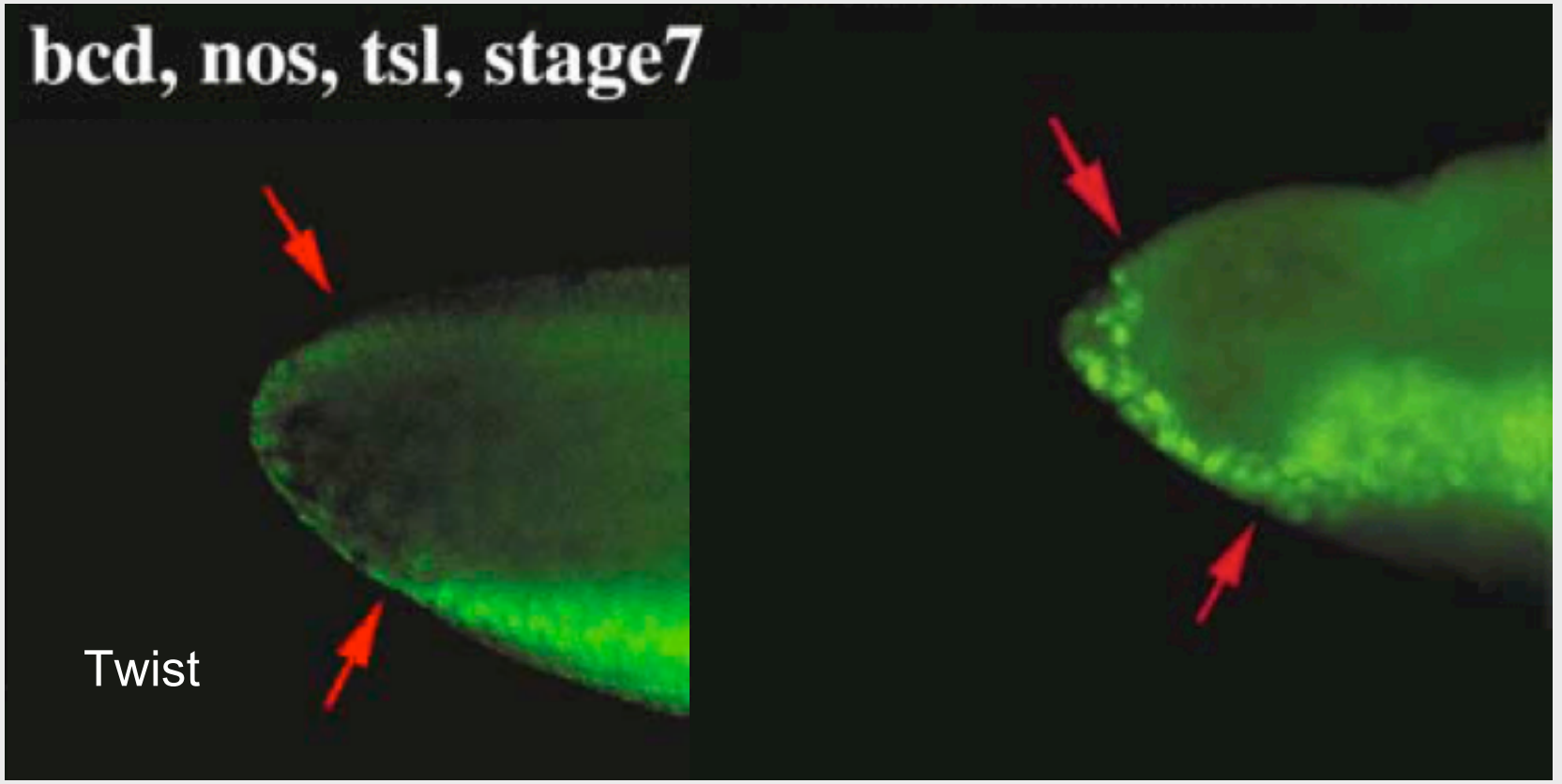
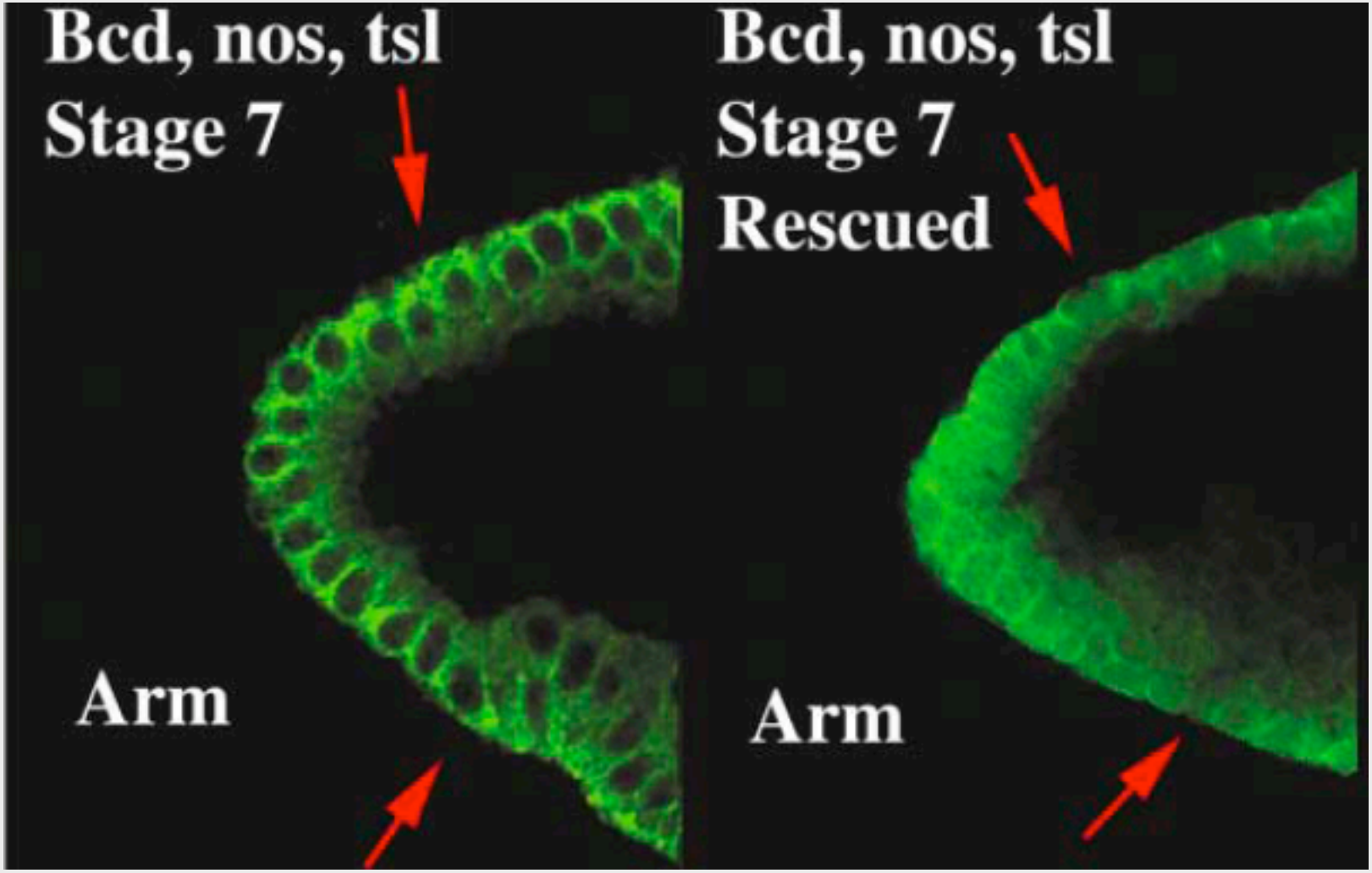


Some memories from the first exercice …

… Results: relocalization of Armadillo by poking



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… Results:

✓ Armadillo (Beta-catenin homologue) is relocated from membranes to nucleus under cell shape changes.

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✓ The deformation of anterior cell shapes is caused by germ band extension

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… And unanswered questions!

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✓ Role of Twist in invagination?

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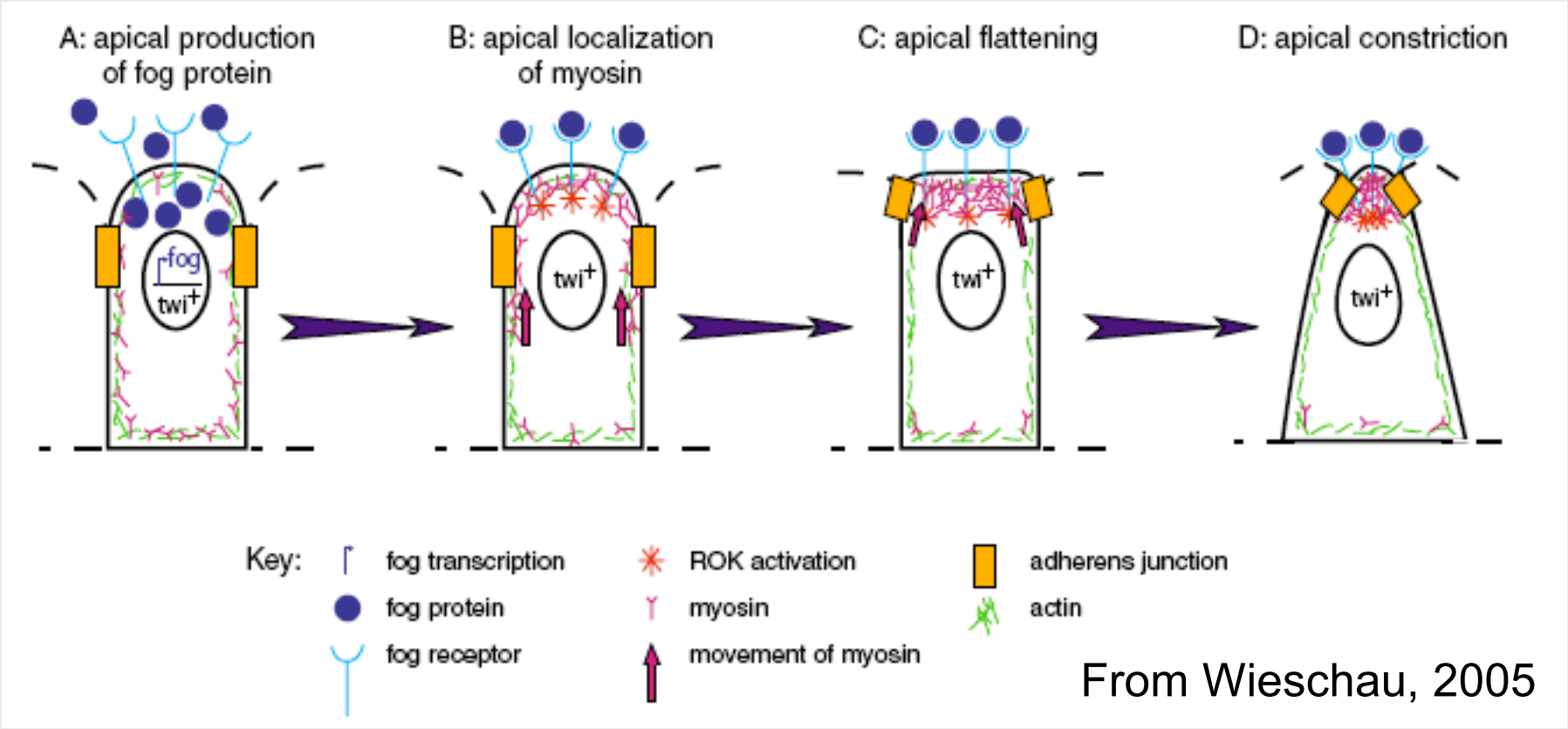

From Wieschau, 2005

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… And unanswered questions!

✓ Role of Twist in invagination?

✓Generality of the mechanism (other invagination)
+ Cooperation with other mechanisms?

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✓ Role of Twist in invagination?

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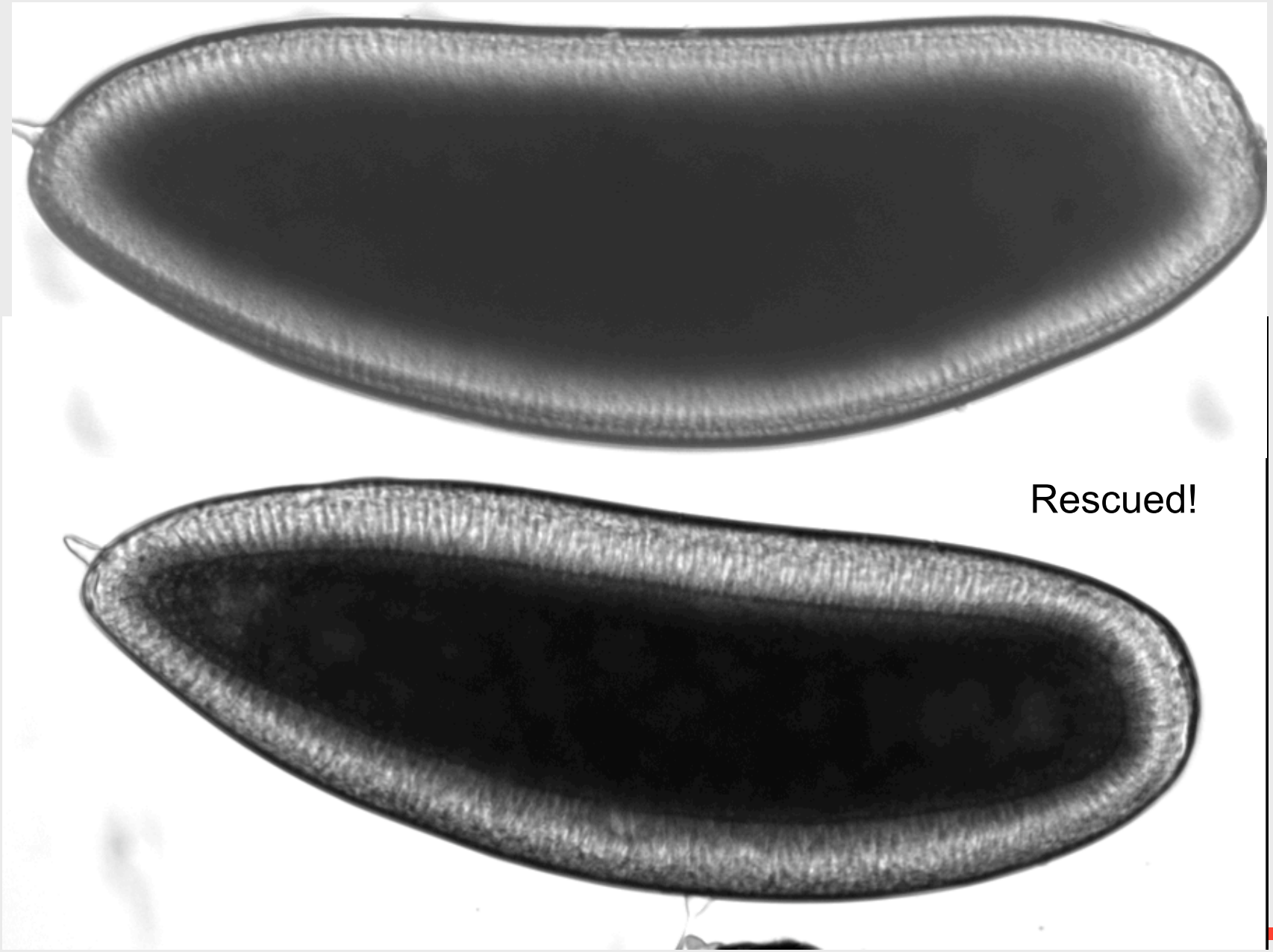
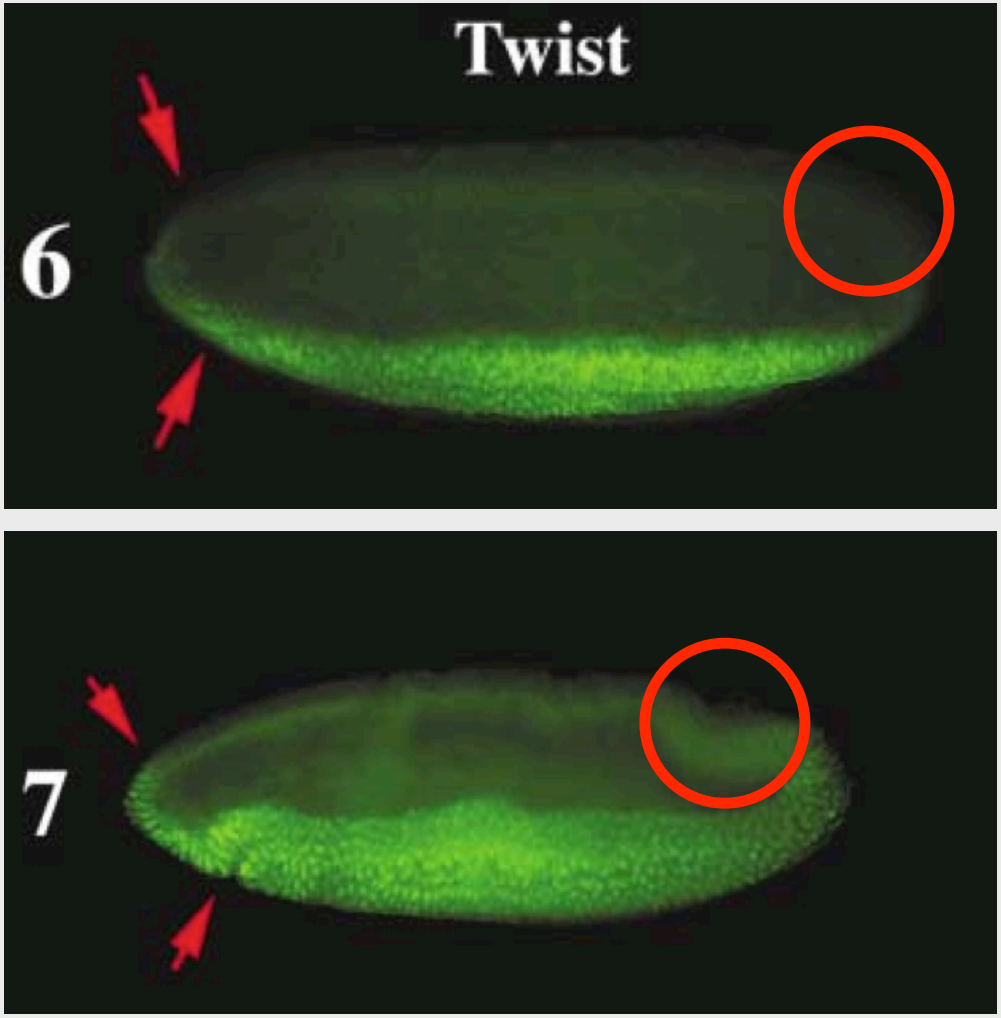
… Yes!

Snail --> 20% of random ventral cell contraction --> mechanically induced inhibition of Fog endocytosis --> relocalization of myosin apicaly --> general contraction [--> Twist = self reinforcement] --> ventral furrow formation… ???

Snail minus homozyogtous: no ventral furrow formation



My unanswered question and our plan to answer it



No strong Twist expression on the back!

… but still physical compression & an invagination!

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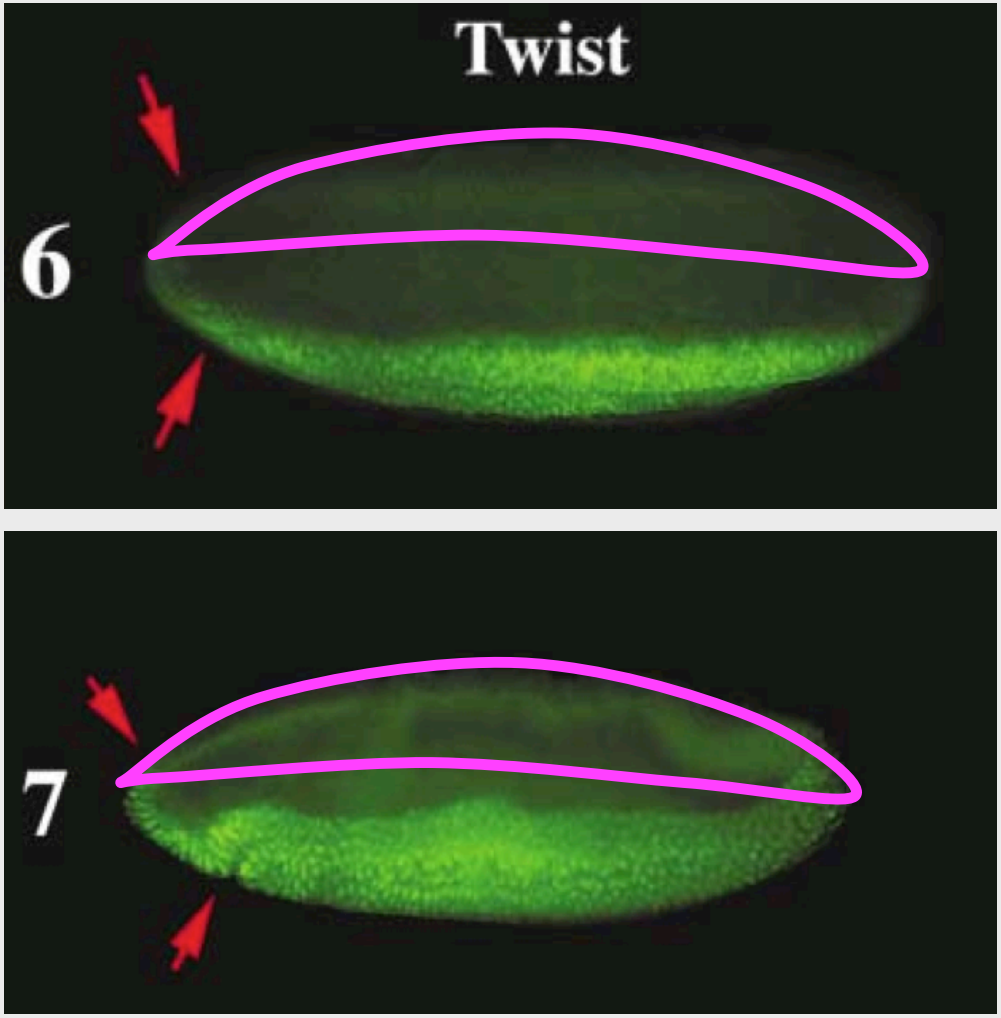

Hypothesis:
There is a dorso-ventral pre-pattern:

- on ventral side Armadillo is competent to trigger Twist
- on dorsal side Armadillo is not

Arm inhibitor

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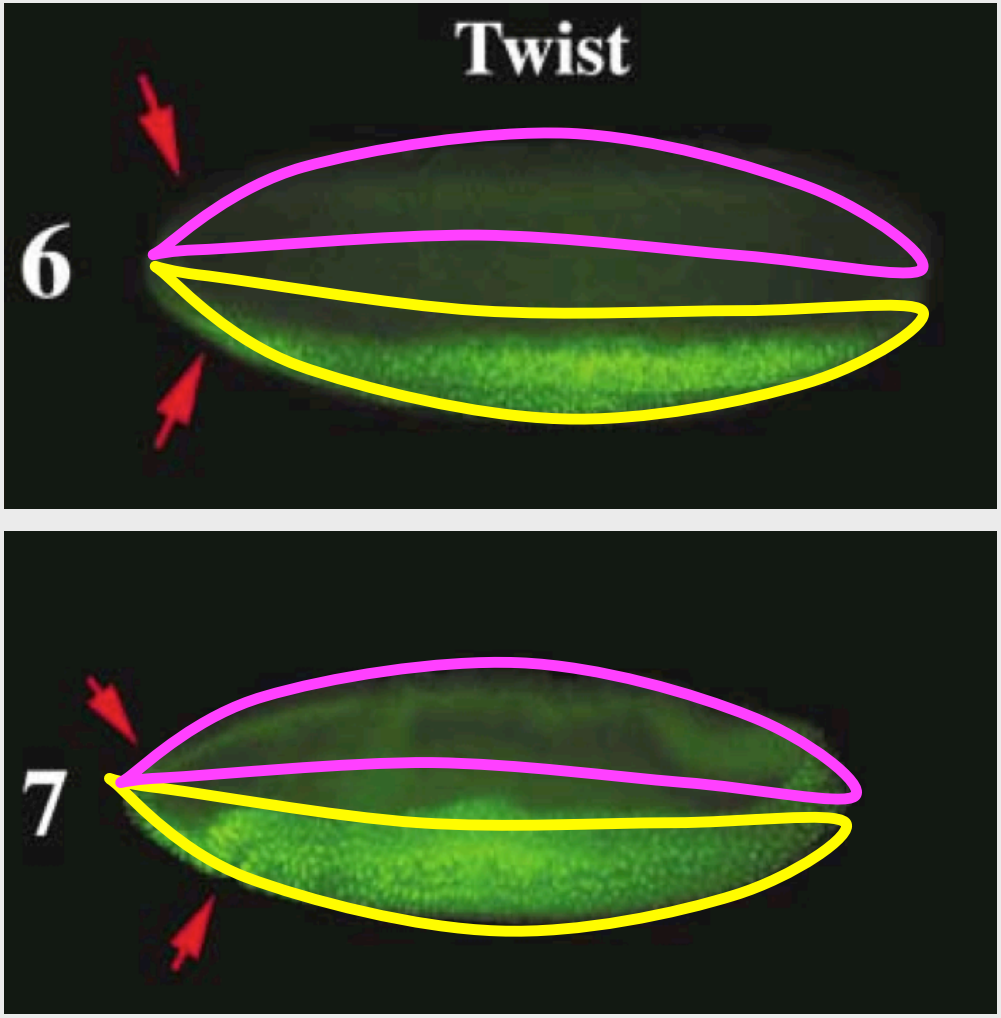

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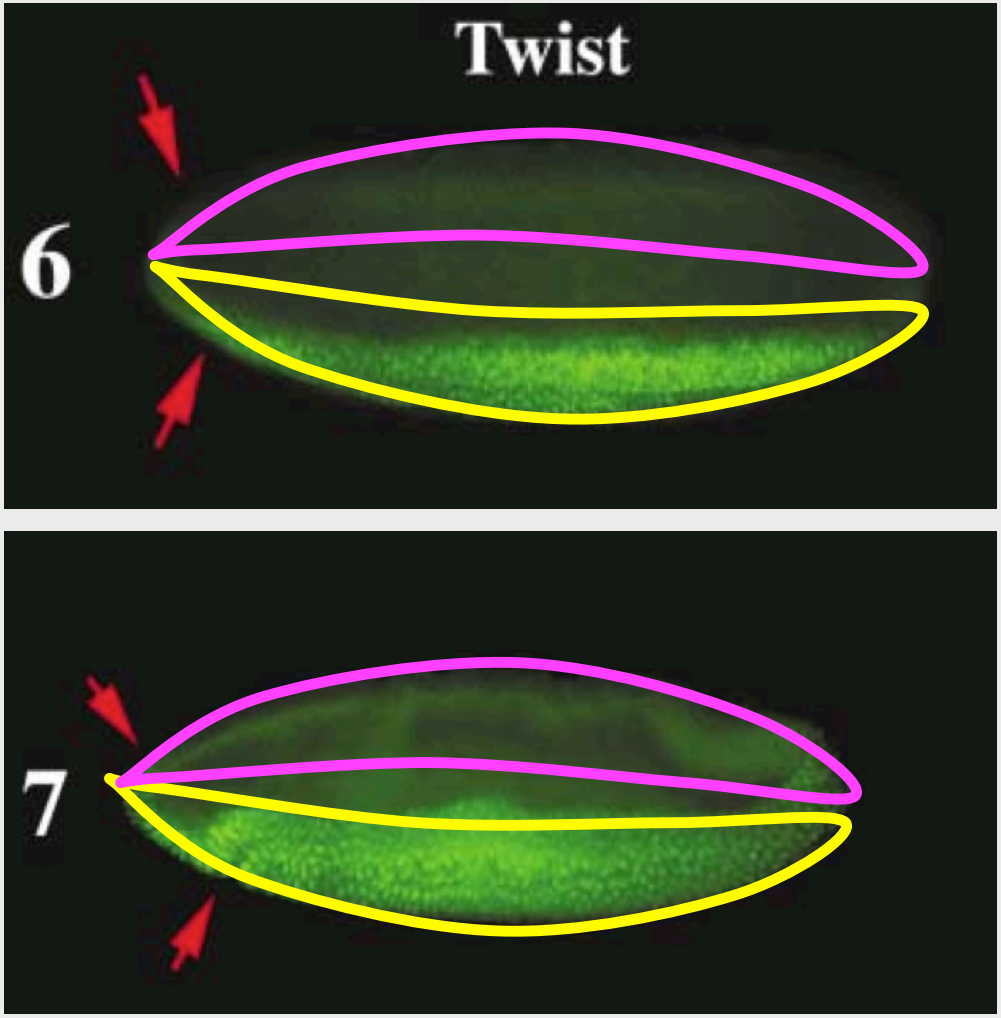

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1) A gene candidate approach with two criteria:

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… And cephalic furrow is twist independant, and occurs along Dorso ventral axis!

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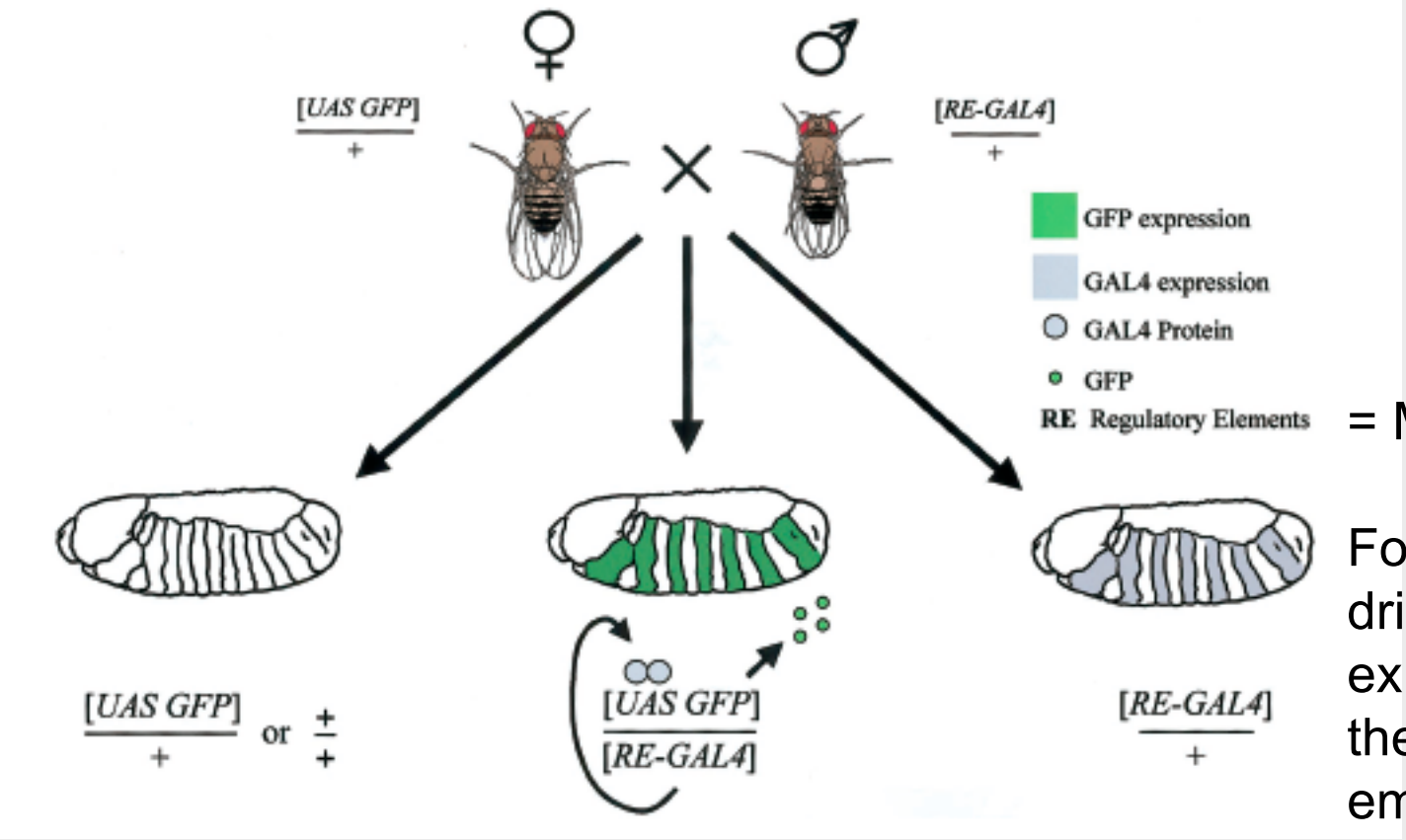


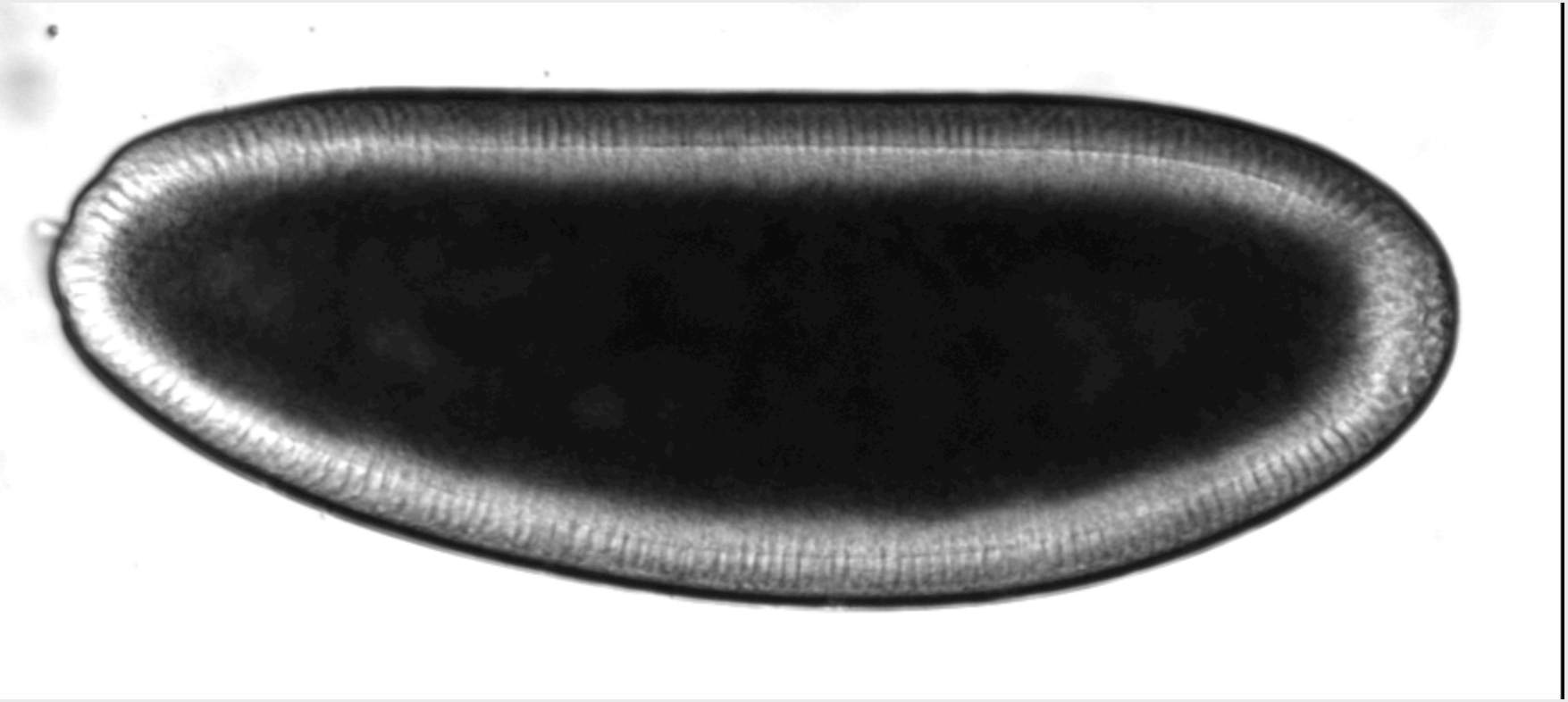
= Mat

For maternal, drives the expression in the entire embryo

My unanswered question and our plan to answer it … practically

1) Cross Mat-Gal4 F or M with UAS-candidate M or F at 28°C

2) Poke the back of a stage 6 offspring for 4 minutes at 28°C



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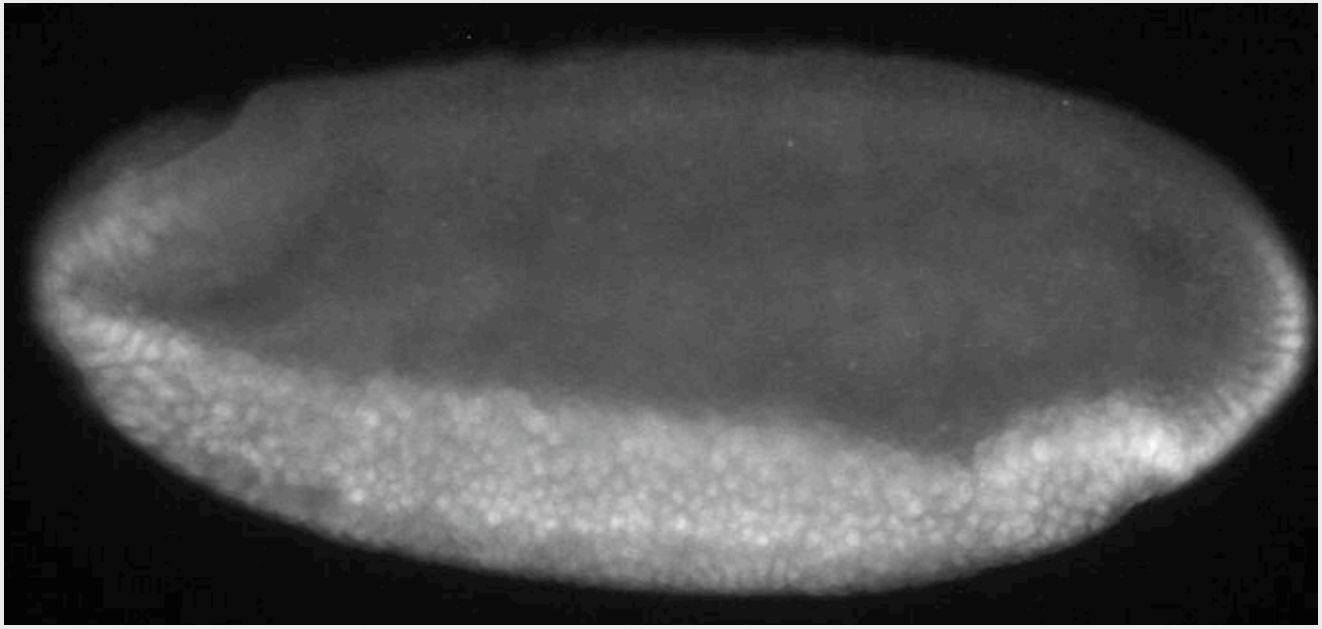
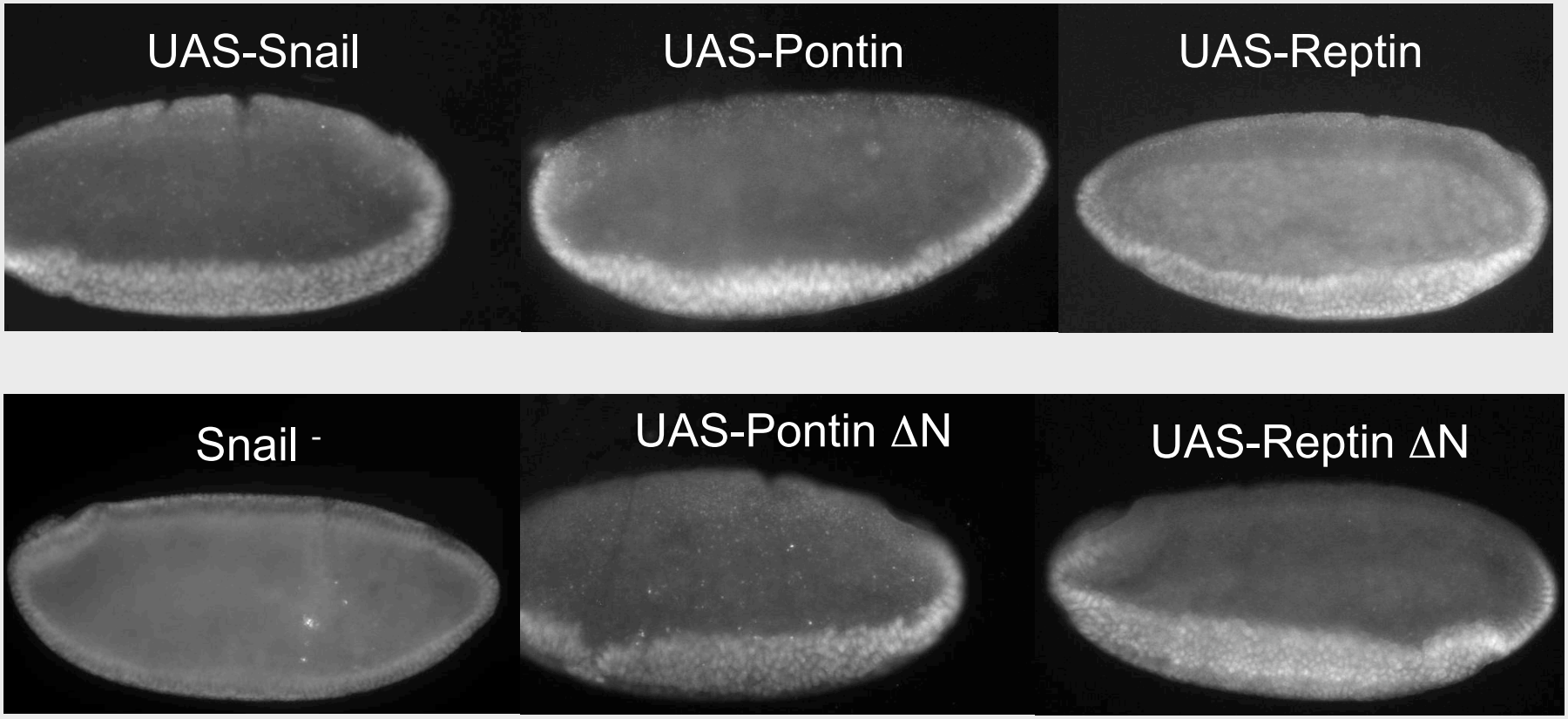
3) Label with Twist Ab and look for a dorsal Twist pattern



Missed!

The negative results to my unanswered question

Twist Ab labelling:



Reasons for keeping on working on July…

1. The poking was supposed to be 10 minutes …

… but 10 minutes at 21°C = 6 minutes at 28°C (fast development)

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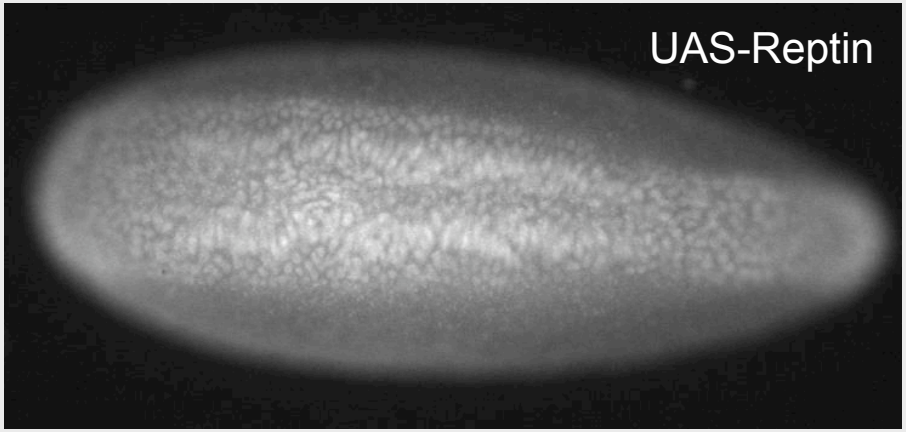

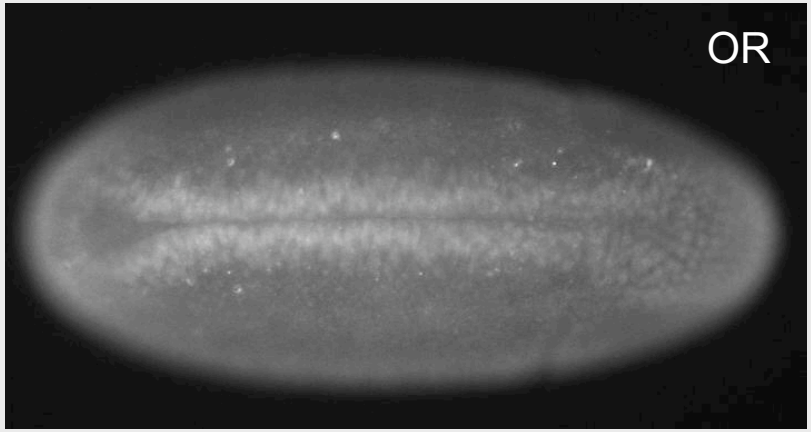

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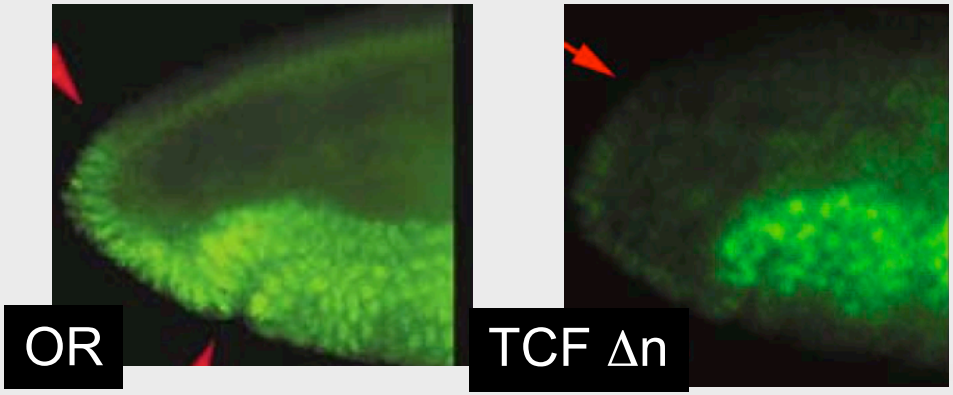
4. Small peripherical projects…



Same effects on the ventral furrow?